In This Issue—*Service Is a Gold Mine in California*

MOTOR AGE

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Volume XXXVII
Number 20

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CHICAGO, MAY 13, 1920

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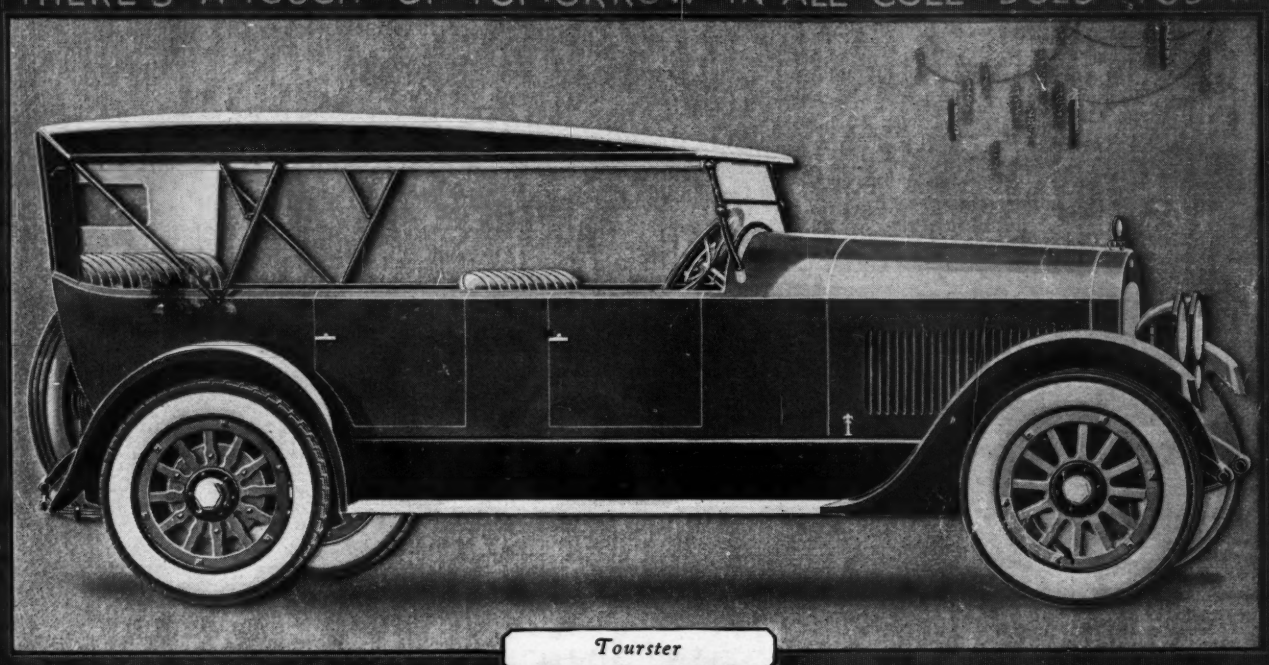
THERE'S A TOUCH OF TOMORROW IN ALL COLE DOES TODAY



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A determining factor among motor cars, the *Aero*-EIGHT wields a mighty influence over the whole trend of the Industry.

And Cole dealers, therefore, enjoy the prestige of leadership wherever motor cars are sold because of the car's advancement.

COLE MOTOR CAR COMPANY, INDIANAPOLIS, U. S. A.
Creators of Advanced Motor Cars

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In

YOU can keep your motor snappy and full of "pep" by ***preventing*** the accumulation of carbon.

Don't wait until your engine is choked and caked with it. Use Johnson's Carbon Remover every 500 miles, then the carbon is removed while it is soft and powdery, eliminating the frequent grinding of valves and ***keeping*** the motor ***always*** clean. No experience or labor required—you can easily do it yourself in ten minutes—and the cost is trifling.

Easy — Clean — Safe — Quick

Johnson's Carbon Remover is the easiest, cleanest, safest and most satisfactory remedy for carbon. It will save you from $3.00 to $5.00 over any other method without laying up the car. A dose of Johnson's Carbon Remover, the engine laxative, will stop that knock—quiet your motor—save your batteries and reduce your gasoline consumption 12% to 25%.

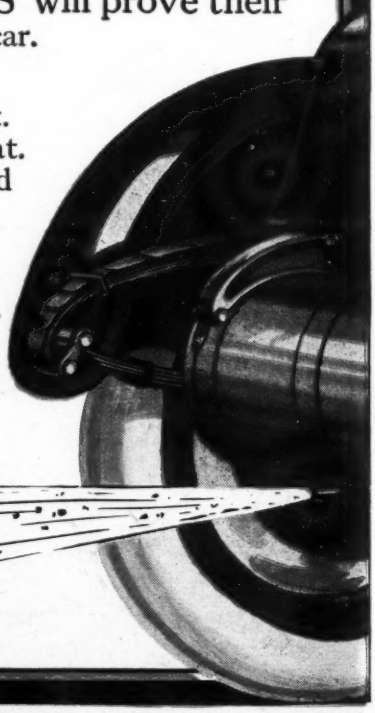
Keep Your Car Young with Johnson's Car Savers

Start today to reduce the depreciation of your automobile. An hour or two every month and JOHNSON'S CAR SAVERS will prove their value in dollars and cents when you come to sell or turn in your car.

Johnson's Radiator Cement—liquid.
Johnson's Stop-Squeak Oil—a wonderful spring lubricant.
Johnson's Valve Grinding Compound—gives a velvet seat.
Johnson's Cleaner and Prepared Wax—make body, hood and fenders look like new.
Johnson's Black-Lac—the perfect top dressing.
Johnson's Auto-Lak—a splendid one coat body varnish.
Johnson's Hastee Patch—can be applied in two minutes.

Write for our folder on "Keeping Cars Young"—it's free.

S. C. JOHNSON & SON Dept. MA 5 Racine, Wis., U. S. A.



Out

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CONTENTS

Copyright 1920, The Class Journal Co.

What Good Roads Have Done for California 7
A Baseball Score Board Time Sheet....10
Accomplishments in Garage Architecture....12
Adjusting the Carbureter—Article II....14
Service Managers Who Have Made Good....17
A Plea for Comfort in Tractors....17
Uses of the Crane Puller in the Shop....31
Description New Hispano-Suiza Six....32

NEWS SECTION

April Production Falls Off One-third.... 19
Rebuilt Cars Demand High Prices at Chicago Show.... 20
Complete Arrangements for St. Louis Truck Tour.... 20
California Tractor Schools Real Thing.... 21
Name Cities for Sectional Tractor Shows.... 21
Indiana Farmers Against Road Building.... 22
Cincinnati Men Push Road Improvements.... 22
Cut Philadelphia Theft Insurance Rates.... 23
Southern States Plan Many New Roads.... 23
Cincinnati Air Dream Largely Air.... 24
New Aircraft Shown at San Francisco Show.... 24
Chicago Garage Owners Grant Wage Increase.... 25
Water Shipments Aid Car Transportation.... 25
Government Issues Fuel Specifications.... 26
U. S. Conducting Experiments on Fuels.... 27
K. C. Dealers Organize to Meet Credit Crisis.... 28
South Carolina Outing Program Announced.... 29
"Ship-by-Truck" is Week's Slogan.... 30

DEPARTMENTS

Servicing the Overland Four.... 34
Garage Planning.... 36
Readers' Clearing House.... 38
The Accessory Corner.... 44
Service Equipment.... 45
Law in Your Business.... 46
Weekly Wiring Chart.... 47
The Automotive Repair Shop.... 48
Truck Specifications Table.... 50
Where to Obtain Parts for Orphan Passenger Cars and Trucks.... 55
From the Four Winds.... 56

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PRECISION
BALL BEARINGS
(PATENTED)

The trouble-proof car, or truck, or tractor, or power boat, has yet to be placed upon the market. But each passing year carries automotive construction closer to this ideal. And —under the same impulse toward betterment of practice and improvement of service —each year brings an increasing demand for these proved, dependable, high-grade magnetos and lighting generators in which "NORMA" Bearings are standard.

See that your electrical apparatus is "NORMA" equipped.

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SERVICE

Ball, Roller, Thrust and Combination Bearings

HE L-FI
"THERE IS A
HE L-FI
FOR EVERY MOTOR"
THE HE L-FI COMPANY, BELVIDERE, ILLINOIS, U.S.A.

The Publisher's Service Station

Rendering Service to Help You Render Service

STEADY!

One of the first industries to get back on its feet at the close of the war was our own—The Automotive Industry. Within 60 days it had forced itself back into business, put on its shows, and the result was a stabilizing influence that worked a wonderful benefit to the whole country.

That was reconstruction, but, with all this alertness, demand is still ahead of supply, and, as we all know, the same is true of practically every other industry. This condition means that we are facing a period of readjustment. Some extreme pessimists have predicted that everything will go to smash; others of a more optimistic nature see it as a mere slackening of activity.

Conservative heads know that the vicious circle of higher prices and higher wages, each chasing the other around, and credit and expansion going on and on, cannot continue forever and that some day we would ponder and take a bit more sane view of things in general.

Leading economic statisticians point out that there will be some business changes next fall. Perhaps there might be an abrupt change, but our banks, who are the beginning and end of most business activity, have decided that they can ameliorate conditions by taking hold of the situation NOW instead of next fall and thus ease the adjustment instead of letting it come with a bump later on.

This is one reason why it is now practically impossible to secure loans unless there is a real legitimate reason for borrowing. Like everything else, the demand for credit right now is greater than the supply. It would take a Philadelphia lawyer to explain all the reasons why, but nevertheless that's what all these bank restrictions mean.

Some little agitation was caused in the automobile trade when one banker sort of got off on the wrong foot and revived that old wartime story about the motor car being a "pleasure car" and a luxury. By the time he gets through hearing from a flock of substantial citizens he may change his mind, for THE MOTOR CAR INDUSTRY WILL GO THE LIMIT IN HELPING STABILIZE BUSINESS, BUT IT WON'T FOR ONE MINUTE STAND FOR BEING CLASSED WITH FRENCH PERFUMES AND SCENTED TOILET WATER. The banks, or any one else, can have our shirts for the asking—if they are needed—but they can't do much except create opposition if they start making uncomplimentary remarks about the nation's third—or maybe second—greatest industry, and one without which the war never would have been won.

Therefore, the thing for every motor car dealer to do is, above all things, keep his head. DON'T GET EXCITED, no matter what happens. The world is NOT coming to an end, the industry is NOT going to be wiped out, we are NOT all going into bankruptcy, and we're going to have the greatest prosperity we ever had when we get the dust out of the air.

If you don't need money, don't borrow it. Take it easy for a while.

But let's not sit down and loaf. Let's keep selling. If you can get cars, SELL THEM. Anyway, keep your shop going AT A PROFIT.

Make money on used cars. Collect your bills. Run your shop on a cash basis—or its equivalent. Keep some cash or credit in reserve some place.

Let's cut out the leaks in our organization, take up the slack in the rope, and be the efficient business men that we ought to be, no matter what the year or season.

Let's keep cool, keep plugging, play safe, and let's not imagine things that won't happ

The good old U. S. A. has been here for over a hundred years, it has gone through wars and panics and epidemics and prohibition—and we're all here yet. Furthermore, labor and capital are just you and I and our neighbors, and if somebody doesn't settle the thing it will settle itself. It's GOT TO.

And so, you see, if we'll just put a piece of ice under our hats and preserve our calm, and if we'll talk sense to the Hans Foolishes, and if we'll keep our business on a conservative, efficient and aggressive basis, as we always should do, and if we'll just keep jogging along and playing the part of the same somewh harassed but stable citizens that we were during the war, the readjustment will come through that much easier and we'll be all set for a big inning.

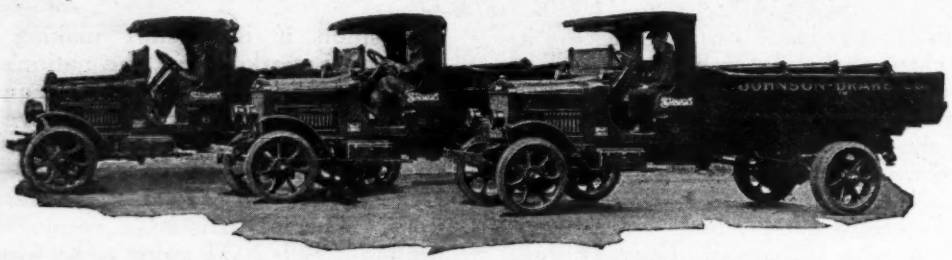
Do you remember the things you heard during the war, when folks said you were going to be eliminated? And do you remember how we all came through all right—and then some?

Well, we're going through a little—and much smaller—difficulty again. And MOTOR AGE wants to say now that if you'll stick to the lines in this story everything will come out all right.

It's GOT TO.

Stewart

MOTOR TRUCKS



Stewart owners buy more Stewarts

Many business men buy a truck too light for their requirements.

When it wears out they buy a Stewart.

The man who starts with a Stewart finds his business grows, and adds another Stewart.

Many who began with one are now running fleets of Stewarts.

These facts prove that Stewarts satisfy their owners.

Stewarts are giving this fine service today in over 200 lines of business, in over 800 American cities and in 38 foreign countries.

We own seven Stewart trucks, five 1½ tons, two ¾-ton capacity. The first three-quarter ton truck we purchased March, 1913, has been in constant service, apparently good for six more years.

When we buy more trucks they will be Stewarts.

Service has been dependable at all times.

GOMERY BROS., Allentown, Pa.

Chassis prices f. o. b. Buffalo: ¾-ton $1350; 2000-lb. $1655; 1½-ton $2250; 2-ton $2875; 2½-ton $3095; 3½-ton $3895

STEWART MOTOR CORPORATION, BUFFALO, N. Y.

Stewart trucks have won—By costing less to run

Vol. XXXVII, No. 20 CHICAGO, MAY 13, 1920 $3.00 Per Year

MOTOR AGE

WHAT GOOD ROADS HAVE DONE FOR CALIFORNIA

The Motor Car Is King in Southern California and Everybody Caters to Its Need

BY FRED M. LOOMIS

RIVERSIDE, Cal., May 10—A very large percentage of the motor car dealers in this part of California apparently just have moved into new buildings or are just about to do so. I have not been in a single town yet where new sales and service stations are not being built, and for the most part it would seem that they are badly needed, too.

Three things in especial are to be noted about the automotive establishments in the many towns surrounding Los Angeles. These are:

1. The surprisingly large area of floor space devoted to strict garage purposes.

2. The completeness of the shop equipment for the rendition of both regular and emergency service.

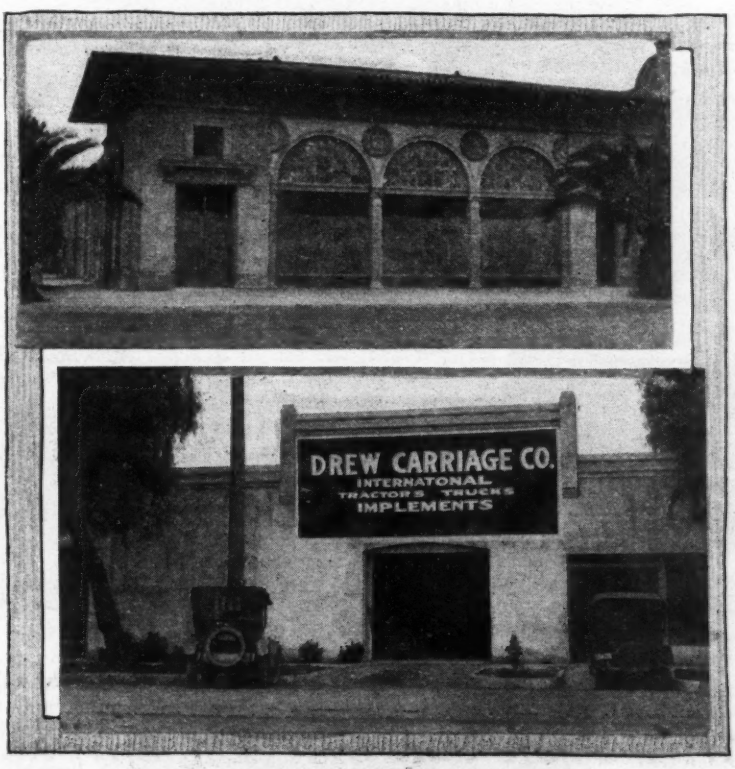
3. The size and number of the stocks of accessory parts, the convenience of their arrangement and the remarkable ability shown by majority of the dealers in making an attractive display of their stock.

According to recently compiled statistics, there are more motor cars per capita in California than in any other state in the Union. Magnificent roads cover the state like a net. The tourist population, always large here, regardless of the season of the year, supplemented by the automotive activities of residents who burn to show newcomers around, popularize the motor car as a means for getting over the country. Business men here, too, use motor cars more extensively for business trips than I ever saw done anywhere else. The man who has business in the Imperial Valley, or down at San Diego, or up at Fresno, or even as far away as San Francisco, does not go on the train—he motors. I have seen a tractor distributor, for instance, start in the middle of an afternoon for the Imperial Valley, a drive of some 200 to 250 miles. The run to San Diego is a mere nothing. The 600 miles or so to San Francisco are undertaken on a moment's notice. The Chicago business man who would motor to Pittsburgh or to Omaha would be a curiosity. Out in this country little business trips of equal distance and even more miles are undertaken as a regular part of the daily business routine.

Then nearly every man who has occasion to travel Southern California for any purpose whatsoever—and this includes all traveling salesmen, for instance—uses the motor car as a matter of course. Ten months out of the usual twelve in the year the weather is absolutely dependable, and the roads always are good.

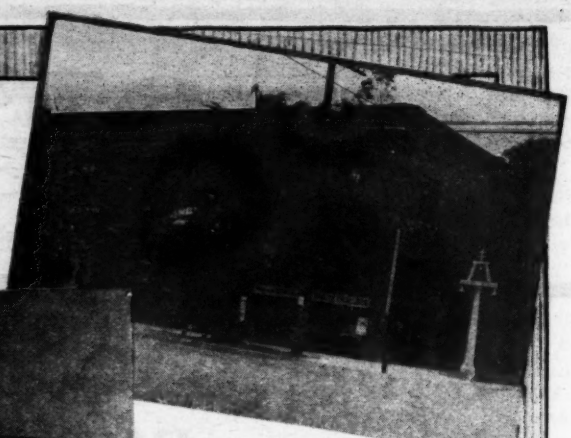
These things make Southern California par excellence the land of the motor car. It is said that something in excess of 80,000 cars are owned in Los Angeles alone, a city of less than 750,000 inhabitants. This fact makes business for the garages and service stations, and every motor car dealer, no matter where he is located, builds with this in mind. It is probable that the enormous increase in the number of motor cars owned in this section, coupled with the influx of thousands of tourists' cars during the season of outdoor camping, is primarily the reason why the demands for automotive service have outgrown the old establishments and why so many new ones are being built to handle this work.

Something already has been said of the extent to which the motor car supplants all other means of locomotion in Southern California. This is accomplished, too, without an apparent diminution in the crowds which ride on the steam and electric lines. All Southern California seems to be constantly moving. One gets this impression probably because of the



Top—Thomas Crossley, Hudson and Mitchell. This is one of the new sales and service stations and in the arrangement of the various departments nothing is left to be desired. Below—Riverside branch of the Drew Carrage Co., implement concern which by means of its service has sold more tractors in its locality than has any other concern

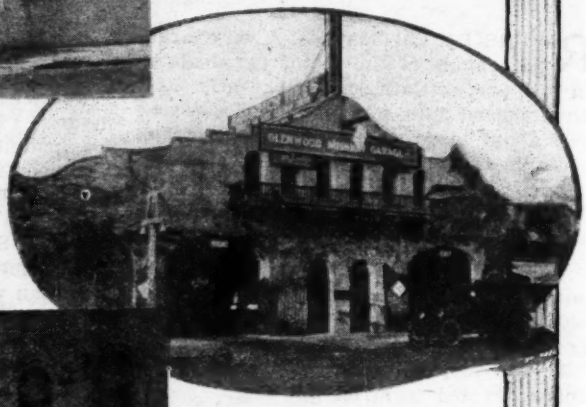
Corner of the Mission garage at Redlands



J. W. Kemp at Riverside has an attractive place from which to sell the Cadillac and the Nash

Merely typical of garage architecture in the Southern part of California. There are hundreds and hundreds of such places

Below — Another type of garage that is quite usual all through Southern California



The Central at Riverside— Typical of the garages and service stations to be found all through this section

Ths garage of the Glenwood Mission Garage, Inc., selling the Studebaker cars and the Cletrac tractors is so covered with vines that it is difficult to get a picture.

Below, The Fageol is sold by A. Difani & Sons and the company gets across with a brand of service that makes good

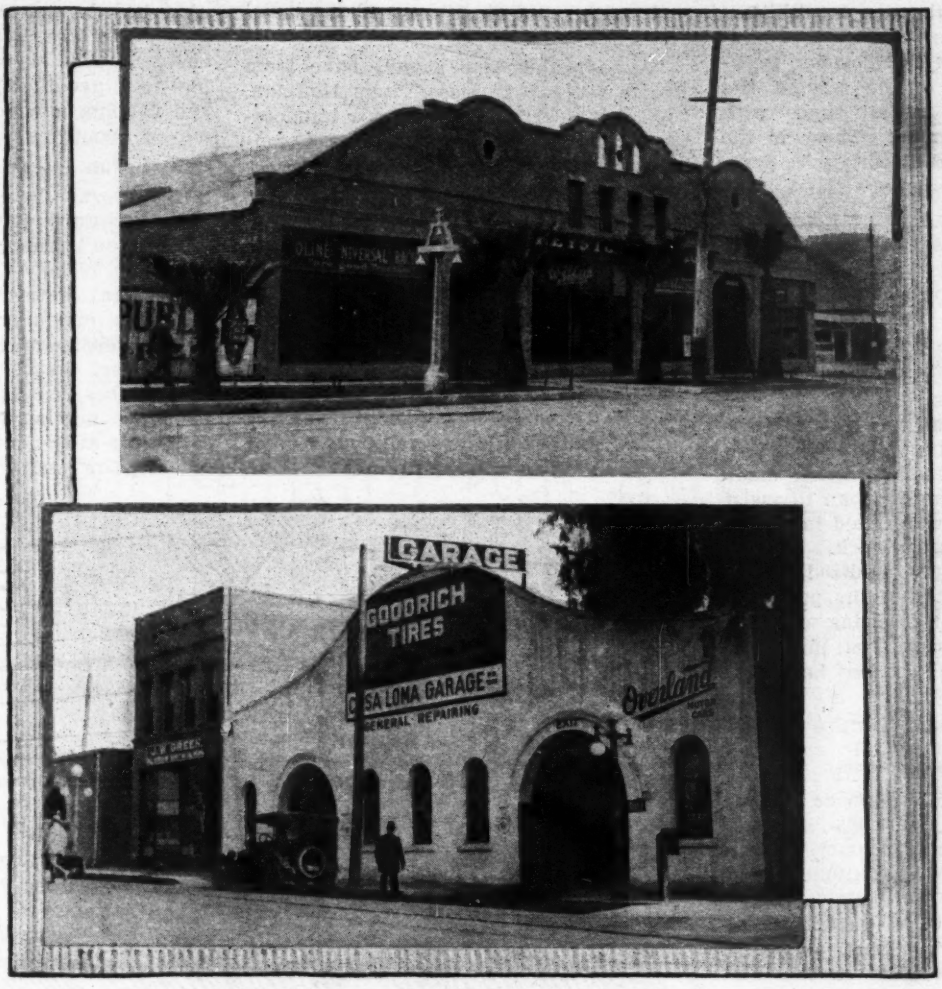
Glen A. Calkins sells the Ford and Fordson at Riverside and is one of the live wires in the automotive trade of that town. He has one of the best equipped service stations in the district

New sales and service station of Button Bros., Chevrolet and Scripps-Booth dealers at Riverside. This concern will take on the Samson line as well. This is one of the latest built of Riverside's garages.

large number of transients and tourists who constantly appear to be running all over this section. Hardly can one board a train or a trolley car and secure a seat alone, and most of the roads within many miles of Los Angeles present the aspect of motor car processions.

Without regard to the thousands of tourists who camp by night at the roadsides, there are thousands who throng the hotels and who commit their cars to the custody of the nearest garage. To take care of the local garage service, which is normally large in every community, and to house in addition the foreign cars, requires an unusually large area of garage floor space. Furthermore, as nearly every garage is a one-floor structure, a good deal of ground is required.

The newer garages, and some of the older ones as well, run to the ornate in architecture. Many of them affect the Spanish style of design, and nearly all of the newer ones at least are made of concrete, faced with a white or tinted plaster exterior. In contrast with the perpetual green of the country, this results in a most pleasing aspect to the eye.



Top—Garage of Mickey & Stark, Riverside, Overland and Moline-Universal
Below—The Casa Loma garage at Redlands from which the Overland is sold

Dimensions, if given, merely would emphasize the assertion of size. Of course, not all of them are huge. The sizes run all the way from those which would be considered conventional in any average eastern city to the ones which are 200 or 300 feet square, and which would almost cover a half block or so in many places where space is much more valuable than it is here. But value aside, the storage space is needed out here, and so the automotive interests provide it.

The garage without a well equipped shop is the rare exception. As said above, the necessities for local service, greater than is customarily the case in places of equal population in the East, both by reason of the relatively greater number of cars owned locally, the greater mileage due to the fact that a motor car here can be used to the maximum 365 days in the year and because it usually is so used, make necessary provisions for local repair service which are above the normal demands of most eastern communities. Add to this the demand for service, regular and emergency, which comes from the thousands of tourists' cars, and it is very easy to see how imperatively necessary it is to have every automotive shop thoroughly equipped. The tourist, for instance, neither desires nor does he expect to be delayed very long no matter how serious, short of an actual smashup, the damage to his car may be. He expects and he demands that repair service be immediately available. In many California communities it's a matter of local pride that the community repair shops can take care of any repairs.

Small Shops Completely Equipped

It must be evident, both as a booster for local pride, and as a pure business proposition, that the repair shops throughout this section must be thoroughly equipped, and they are. Furthermore, in this matter of equipment, complete latitude is taken in installing the very latest things in automotive shop equipment, and it is not at all uncommon to find a shop in one of the little places in the vicinity of Los Angeles, in one of those places which are popular with tourists, for instance, having a shop equipment which looks out of proportion to any possible demands, unless one really understands the reasons behind it.

Illustrative of this very common readiness to give service, it is probable that the shop feature of most of the automotive concerns in Southern California is emphasized more than one usually finds it to be the case elsewhere. In addition, the prevalent rule for all shop service is spot cash. The necessity for this is evident when one considers the large percentage of tourist demand. Also the same fact will account for the large and complete stocks of spares which most of the garages carry. In fact, the service end of the automotive business in Southern California is far more important, generally speaking, than is the sales end, although in all probability quite as much attention is paid to the latter here as elsewhere. The distinction between sales and service is merely relative, but one cannot avoid the impression that unusual emphasis is laid upon the service feature.

Immediately connected with the matter of large garage space and adequate service equipment, is the prevalence of large and complete stocks of parts and accessories. Many automotive concerns out here, covering a relatively small sales territory, maintain stocks of spares and accessories which would put the average automotive dealer of the East to shame. As far as I have been able to observe the accessory manufacturers and jobbers can register no kick because the motor car dealer in California will not carry accessories. I have seen many stocks which are magnificently large, and it is the exception to find any sort of an automotive establishment which does not carry at least a respectable stock as regards size and variety.

Another fact in connection with these stocks is the care which is exercised in their arrangement and the scrupulous way in which assortments are maintained. I have yet to see a single instance of slovenly arrangement, dirt, or confusion. Every stock I have seen is well shelved, well binned, and well arranged. In most instances, too, these

(Concluded on page 37)

A Baseball Score Board for the Shop

This Is a Weekly Job and Time Sheet Which Shows Time Chargeable to Owners and to the Shop

IN last week's issue of MOTOR AGE it was shown how the salesmen for William T. Taylor, Apperson dealer in Philadelphia, also are service salesmen, pushing the big feature of the service, the free service report, at all times with prospects and customers. Those in the organization who deal directly with service and shop operation are the following:

The general manager.
The service manager.
The assistant service manager.
The head tester.

The mechanics, ranging from half a dozen to fifteen men, according to the season's demands.

When O. W. Hoffman, the service manager, took hold of the job, he was all alone. Later, business expansion made it necessary to get another man to assist him and soon a boy was added to do the lighter and the lesser work. Almost before the little force realized it, so great was the response of the public to the way the work was being done in servicing Apperson cars, that first one extra man and then another had augmented the outfit.

A somewhat unusual feature of the Apperson service station is that the second floor of the building houses the entire department. The service station is ten blocks from the sales building. Of course, it is quite customary for the service department of an automobile or motor truck concern to have its shop, wherein long jobs are performed, located on an upper floor; but here, even the shortest job must be done on the second floor, as that is the only part of the building occupied by the department.

Large Capacity Elevator

Access to the service station is by way of an elevator of 4000 lbs. capacity, operated by a 2½ hp. electric motor. This permits taking up safely the largest passenger cars.

"I always see to it that the mechanical force has plenty of natural light all through the daylight hours," says Hoffman, "and as soon as daylight has failed, we have a lighting system that is entirely adequate. My theory, and I think I have proved it, is that plenty of sunlight has a marked psychological effect on the workmen, who are much more cheerful, and therefore more efficient, where there is plenty of natural light during the day. When I help pick out a shop, I always insist on getting one where the sunlight is visible throughout the major part of the day."

There are large windows all along three sides of the Apperson shop, which is 90 ft. long by 60 ft. wide. There are work benches on two sides of the shop, directly beneath the windows, each bench well equipped with a vise and the usual small tools.

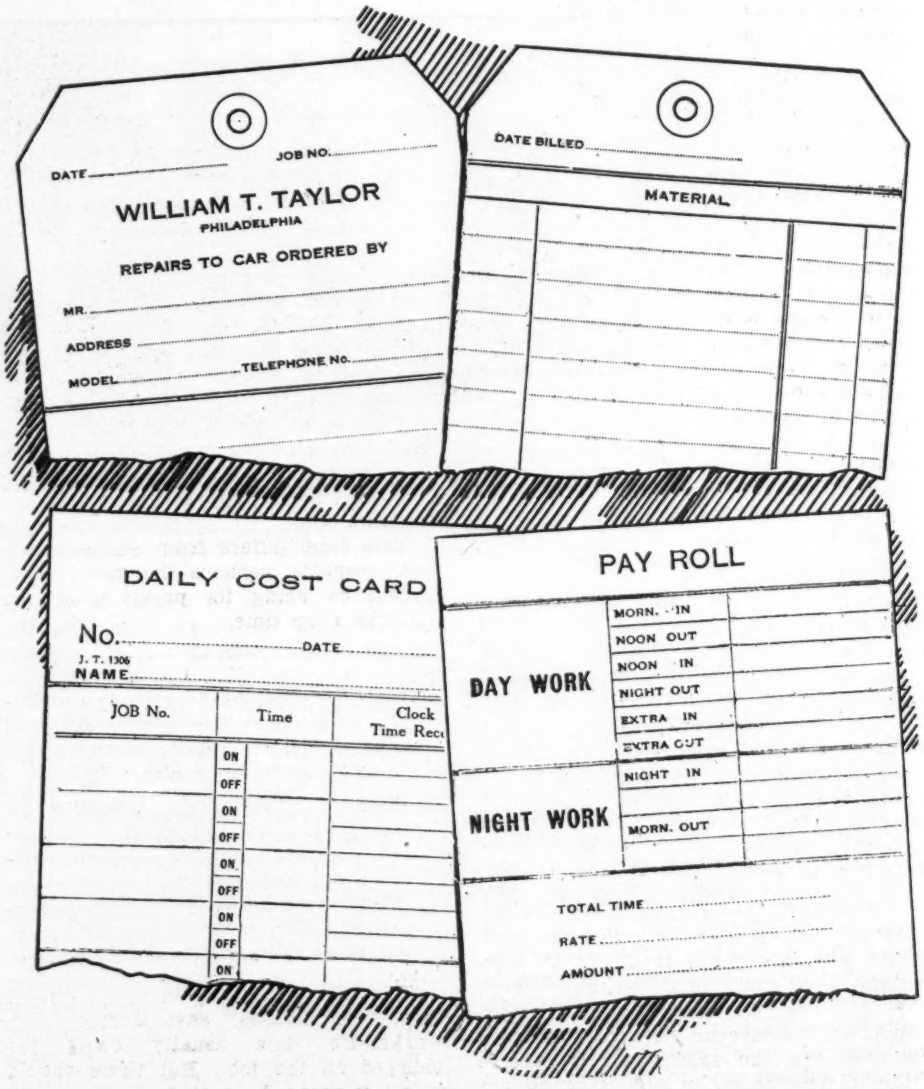
"A shop this size should have from five to six garage vises," says Hoffman. "We don't carry much, if any, unnecessary equipment here, and we are constantly using whatever we have. As we do about everything in the way of repairs except upholstering and painting, we have light electric grinders and one portable electric drill, which makes a hole up to half an inch. We have found it necessary thus far to have but this single drill. I consider an electric grinder in a repairshop a necessity. The first one we got, paid for itself in a few months."

Tires and wheels are religiously kept off the floor, being hung up on the walls. Such parts as hoods and dashes, or running boards and radiators awaiting repairs also are hung up or placed on shelves, thus keeping the mechanics foot-free, avoiding jamming of the parts and keeping a wide path for cars being moved about the place.

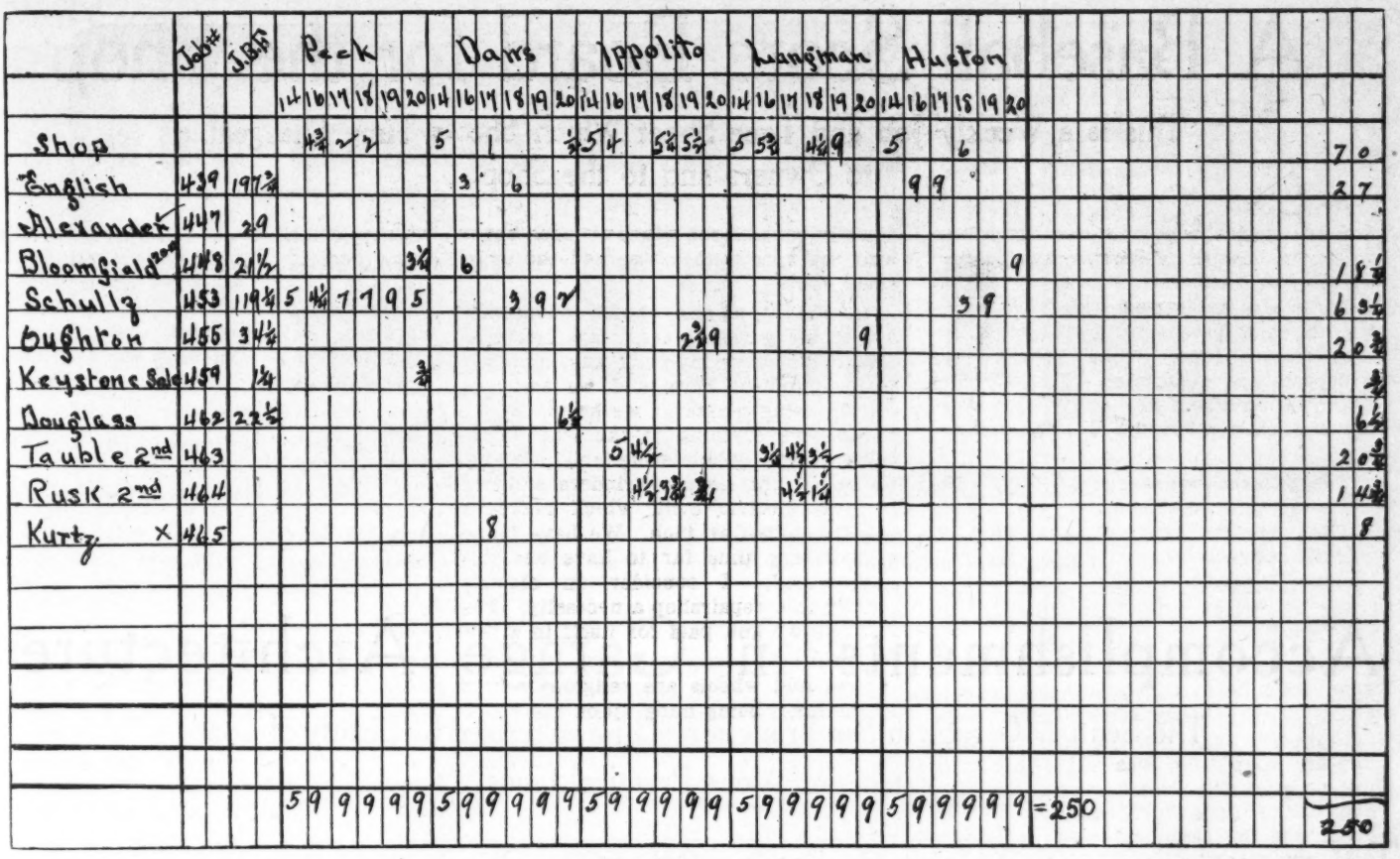
Shop Forms in Use

Shop forms here are at a minimum. The Job Card is a manila tag with perforation in the upper end. Its dimensions are 10 by 4⅛ in. This form contains the instructions following out what the customer wants done in the way of repairs on his car.

This tag, on its face, bears the date, job number, customer's name, address, telephone number and the model of his car, while at the bottom are the legend—All Repairs and Parts Strictly Cash—



At top is the Job Card which contains the instructions as to work to be done and the reverse side the date billed and material used. Below is the Daily Cost Card. The time "on" and "off" a job is recorded. This time is transferred to the Weekly Job and Time Card



This is the Weekly Job and Time Card which is called the Baseball Score. In the left hand column is the name of the owner and in the line to the right of each name is the time worked on that car by the mechanic whose name is above it. At the head of the list of owners is the time charged to the shop when a man is idle. The total working hours of the men and the total time charged to shop and customers should correspond

and space for the customer's signature, as the authorization to follow out the instructions thereon. On the reverse of the card are spaces for date billed, material used on the job, time in date and hours. These particular time entries are not being used at present, the time being otherwise recorded as explained.

Record of Material Used

As the mechanic draws on the stockroom for material for the job, he enters the material thus used on this reverse side of the Job Card. The card, or tag, is hung on the car in a leatherette envelope with transparent front, when it goes to the shop and when the mechanic working on the job has completed all the entries thereon and the car is ready for the customer's call, the card is removed and filed alphabetically under the customer's name.

The Daily Cost Card, a manila form 9 by 4¼ in., is employed for recording the following data for each mechanic: The time, transferred from the standard type of clock card; the mechanic's record of his time, which must tally with his clock card record, indicating suspending and resuming work by "off" and "on," respectively; the job number; the mechanic's name, the card number and the date. On the reverse side of this form, in red lettering are entry-guides for the day and night work, for payroll purposes, indicating "in" and "out"; total time, rate, amount and date.

Transfers of data are then made from the various individual Daily Cost Cards to the Weekly Job and Time Sheet, an original form, each one taking a complete record for the week of all the men's time on all the jobs for that period.

This form, which was made up by Hoffman, is known in the Apperson shop as "The Baseball Score," as it resembles one in general appearance and works out like one.

This form differs from others in several respects, perhaps the most notable difference being its provision for recording shop time.

IN THE APPERSON SERVICE STATION IN PHILADELPHIA:

They have an original Weekly Job and Time Sheet which they call the "Baseball Score."

They charge time against the shop under certain conditions.

They have a miniature mezzanine in their stockroom.

They are all "second-story workers"—in a good sense.

"I noticed this lack in most systems in service stations," says Hoffman, "the workmen's time usually being just charged on the job. But there should, in all fairness, be a time charge to the shop. Supposing, for instance, a mechanic has been idle half a day; on that job there should be a charge to the shop."

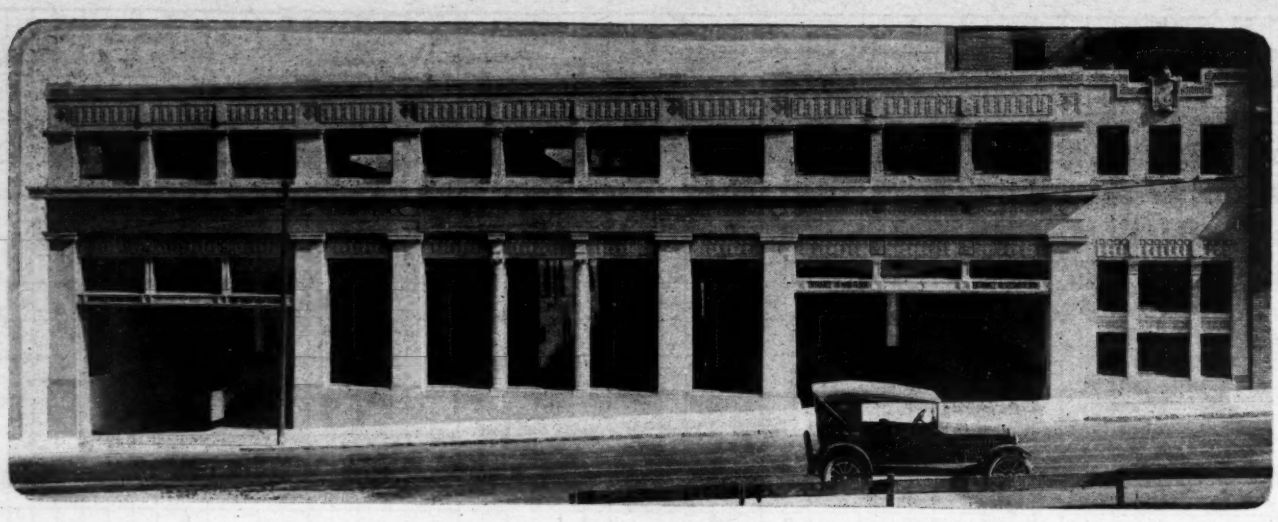
The Baseball Score, or Weekly Job and Time Sheet is a ruled white form, 14 by 8½ in. It is laid out in ten columns where eight men are employed, with one extra column for every man employed above that number. In the first column are the names of every customer having a job in work, in regular batting order—hence the baseball score idea—headed by the item Shop, to focus the shop charges on time, as already explained; in the next column is the job number of the job upon which each man is working; in the next column are "jobs brought forward," the plan being to make this transfer always from one Weekly Job and Time Sheet to the next in order, thus preserving a handy record over an extended period and obviating searching through files; while in the succeeding columns are the names of the mechanics, giving the number of hours each has worked for every day in the week, carrying out further the baseball score idea.

Week Starts on Saturday

In this shop there are six working days in the week, which always starts on Saturday, this day being chosen for convenience in making up the payroll and at the same time holding back five hours' pay on the men in a week.

In handling this form, the number of hours of shop time are added across, or horizontally, to get that total; the time on the customers' jobs, in order,

(Concluded on page 34)



Exterior of the Century Garage showing on the left the entrance to sub-floor and exit from main floor, and on the rght, entrances to main and second floors

Accomplishments in Garage Architecture

The Century Garage in San Francisco Is Characterized by Beauty of Construction Along Practical Lines

THE Century Garage, San Francisco, is a new idea in the garage service, a structure of beauty with many original features.

It is proclaimed by many to be the finest and most modern garage west of the Mississippi river and has just been completed and opened for business. It certainly possesses innumerable features of service and beauty that heretofore have not been found in a garage.

The owners of this garage set out on the principle that garage service could and should be improved, and instructed their architect, August Nordin, to design a garage which would be a radical improvement on the old type. The result was not only the installation of a wonderful battery of pumps, oil and gas buggies and safety devices, but the arrangement of elaborate rest rooms for women, smoking rooms for men, lockers for owners, and the maintenance of personal service of high degree for all patrons.

Curbs to Prevent Accidents

One of the safety features of particular note is the concrete curbs in the floor to prevent collision of cars, and to prevent careless drivers from backing too far.

The structure has a frontage of 124 ft. and a depth of 137½ ft. with the main floor on a level with Post street. The sub-story with a ceiling height of 14 ft. is below the level of Post street, but more than half its height above the adjoining side street, and gets perfect daylight and ventilation. The second story, with a ceiling height of 12 ft, is lighted from the frontage and covered with large ventilating and fireproof skylights. The sub-story and the second floor are made easily accessible with 17 ft.-wide inclined runways which permit traffic going both ways.

A concrete spiral stairway for foot traffic to the second floor forms a unique architectural feature.

Built of Reinforced Concrete

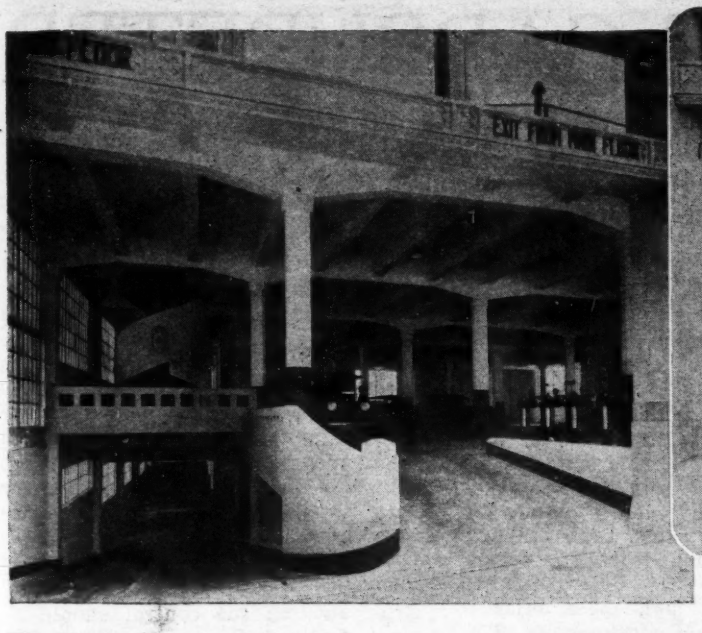
Constructed of reinforced concrete from foundation to roof and with metal windows and skylights glazed with wireglass, the building has been made absolutely fireproof.

Each of the two entrances are wide enough for three cars to pass each other, and the wide aisles permit easy handling of the largest automobiles.

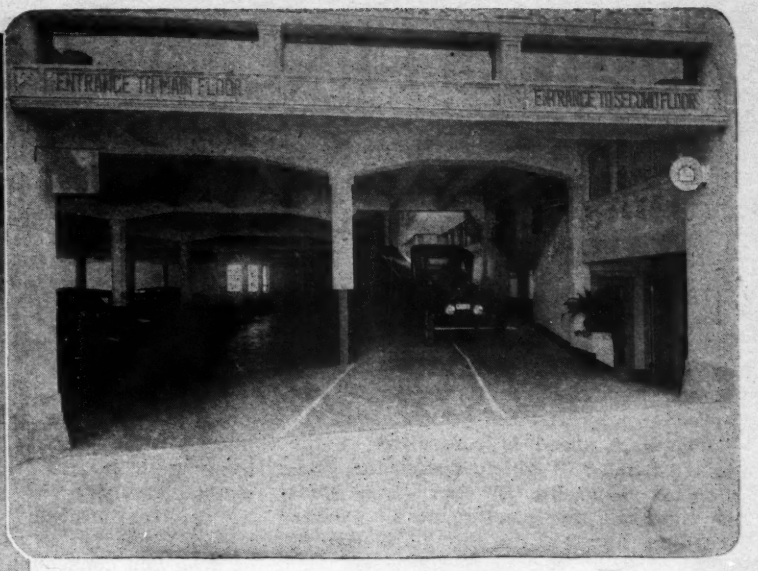
The building will accommodate 225 cars, each car being safeguarded from collision with its neighbor by specially designed concrete division curbs and bumpers, giving each car a safe storage space.

The westerly front part of the main story is divided into two stories, the lower portion containing the office, accessory room, storeroom, telephone booth

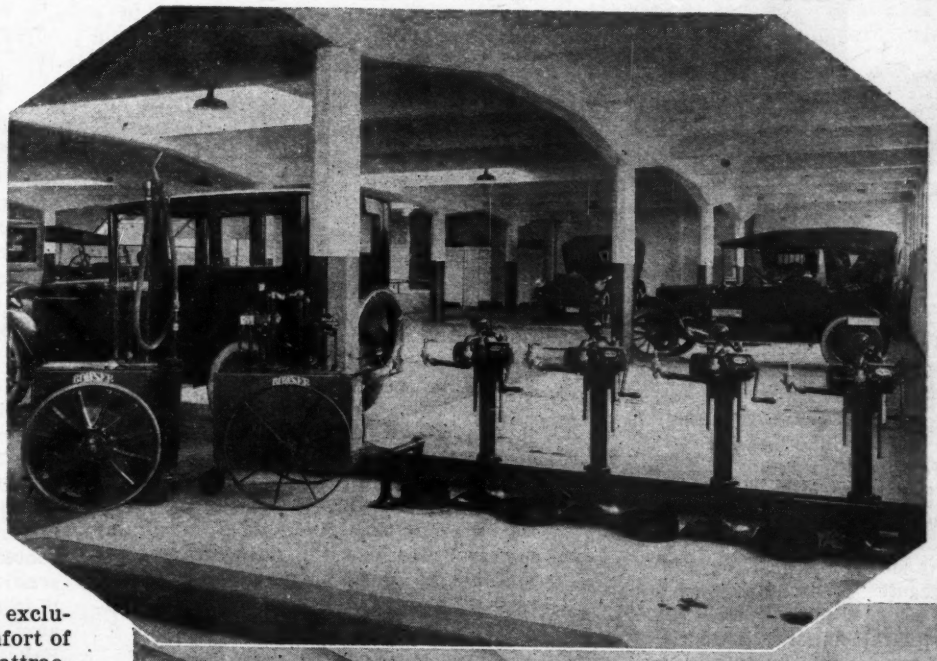
This is not a view of the mezzanine floor in a fashionable hotel, but a corner of the women's rest room in the Century Garage



This shows the entrance to the women's shop in the basement and the exit from main floor. Note the winding staircase and the battery of oil pumps on the right of the exit from main floor



Entrances to main and second floor. On the right is staircase leading to the rest room on the mezzanine floor



Interor view of the Century Garage, showing the abundance of light and a close-up of the oil pumps, the latter being supplemented by the oil and gasoline buggies. Note the drip pans for keeping floor clean

and steam heated lounging room for chauffeurs, with toilet accommodations and lockers for employees. The upper portion, or mezzanine, is arranged exclusively for the convenience and comfort of patrons and friends, with a very attractive rest room for the women. The floors are tiled, the walls are liberally covered with mirrors and the rooms are steam heated.

Vacuum Sweeping Appliance

A three-sweeper stationary vacuum cleaning machine has been installed for the rapid and thorough cleaning of the interior of automobiles and the floors of the building, and a powerful air compressor will deliver 140 lbs. of air at any of the thirty outlets in the building for the filling of tires.

The equipment for handling gasoline and oils is the most complete and systematically arranged in the country, designed to give rapid service.

A large mirror has been so arranged at the top of the incline to the top floor as to give the drivers of cars coming in or going out a perfect view, the mirror being placed at the turn.

This picture was taken at night and shows the excellent lighting scheme used in the Century Garage

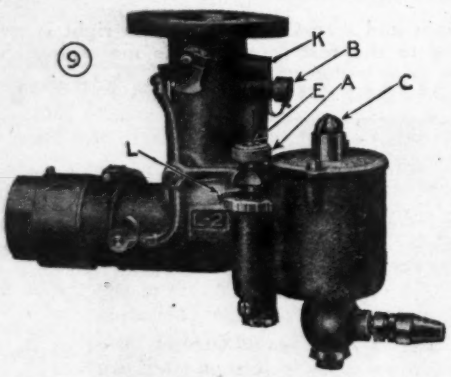
ADJUSTING THE CARBURETER

The Second of a Series of Articles on the Adjustment of All Makes of Carbureters Used as Standard Equipment on All Cars. Makes Using Their Own Carbureters Are Taken Up Individually

BY ROY E. BERG

THE other type of Stromberg carbureter is the model "L" which is very popular. A view of this carbureter is shown in Fig. 9. It has three adjustments, the high speed, the extremely low speed or idle, and the "economizer."

The high speed is controlled by the knurled nut "A" which locates the position of the needle "E" past whose point is taken all the gasoline at all speeds. Turning nut "A" to the right (clockwise) raises the needle "E" and gives more gasoline; to the left, or anti-clockwise, less.



The Stromberg L-2

If an entirely new adjustment is necessary: Put economizer "L" in the fifth notch (or farthest from float chamber) as an indicator; turn nut "A" to left, anti-clockwise, till needle "E" reaches its seat, as shown by nut "A" not moving when throttle is opened and closed. When needle "E" is in its seat it can be felt to stick slightly when nut "A" is lifted with the fingers. Find adjustment of "A" where it just begins to move with the throttle opening, then give 24 notches to the right or clockwise (the notches can be felt). Then move the economizer pointer L back to O notch (toward the float chamber). This will give a rich adjustment. After starting and warming up the engine, thin out the mixture by turning "A" anti-clockwise, and find the point where the engine responds best to quick opening of the throttle, and shows the best power.

The gasoline for low speed is taken in above the throttle through a jet at "K," and is regulated by dilution with air as controlled by the low speed adjusting screw "B". Screwing "B" in clockwise, gives more gasoline; outward, less. The best adjustment is usually 1-2 to 3 turns outward from a seating position. Note that this is only an idling adjustment and does not affect the mixture above 8 m.p.h. When engine is idling properly there should be a steady hiss in the carbureter; if there is a weak cylinder or a manifold leak, or if the idle adjustment is very much too rich, the hiss will be unsteady.

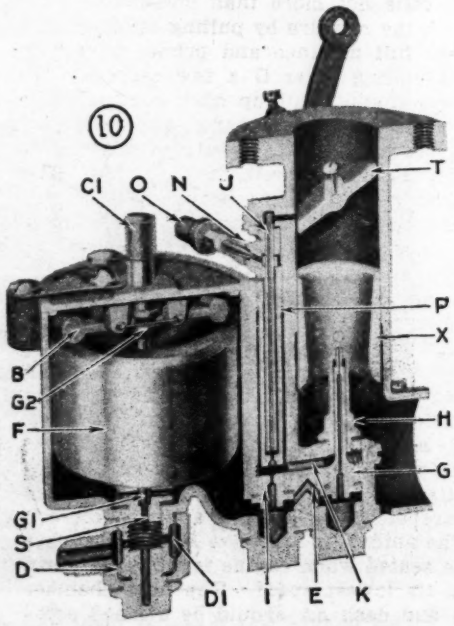
The economizer device operates to lean out the mixture, by lowering the high speed needle "E" and nut "A" a slight but definitely regulated amount, at throttle position corresponding to speeds from 5 to 40 m.p.h. The amount of drop and consequent leaning is regulated by the pointer "L."

After making the high speed adjustment for best power, with pointer "L" in O notch, as above described, place throttle lever on steering wheel to a position giving about 20 m.p.h. road speed. Then move pointer "L" clockwise (away from float chamber), one notch at a time, till the engine begins to slow down; then come back one notch.

The amount of economizer action needed depends upon the grade of gasoline and upon the temperature.

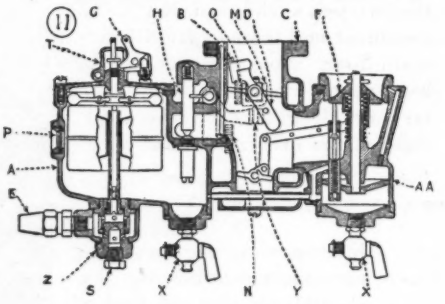
In the Mid-West the best economizer adjustment will usually be the third or fourth notch. With Pennsylvania gasoline and in the South, the second notch; while on the Pacific Coast no economizer action is necessary unless Distillate (which should not be below 50 deg. Baume) is used. Also fewer notches economizer action will be necessary in summer than in winter.

For starting and warming up with the present day fuel, it is absolutely necessary to use the dash or steering post control until proper operating temperature is attained. Ordinarily the engine will start rapidly with the control closed one-half to three-quarters of the way. In very cold weather it may be necessary to pull the control up all the way, but this should be done only for an instant, as this cuts off all the air and delivers raw gasoline only. In starting, the throttle should be nearly closed, or it may be opened and closed while the starter turns the engine over. Never keep the control fully up more than a moment at a time.



Zenith with the compound nozzle

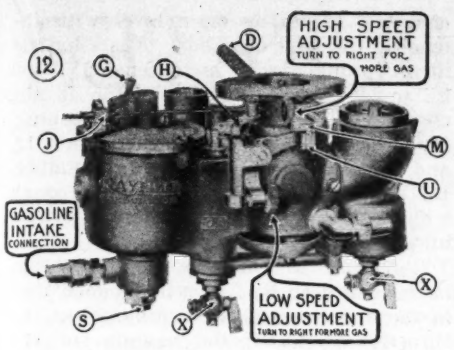
After starting the control should be drawn up as necessary and, allowing the engine a moment to steady itself, should be set at the point of best power, yet not too rich for smooth running; it should then be gradually lowered. While the engine is cold, care should be taken not to open the throttle so far that engine misfires, as this is a frequent cause of sooted spark plugs and gasoline (kerosene) in the crankcase. For winter use it is advisable to partly cover the radiator, as a water temperature of 130 deg. Fahrenheit or above, is absolutely necessary if an engine is to show its normal flexibility and power. Under such conditions the full supply of hot air should, of course, be used. In the warm months the season adjustment shutter on the air horn may be opened to admit cold air.



A sectional view of the Rayfield showing the dashpot

ZENITH CARBURETER

The Zenith carbureter, which is popular with many because of its few parts, uses a compressed type of jet. The compound jet is a combination of two jets, one is that of the simple carbureter illustrated in Fig. 1, and the compound section is concentric jet surrounding the straight nozzle. The second nozzle supplies fuel for an impoverished mixture. The simple jet supplies fuel for an enriching mixture and the action of the two together give a well proportioned mixture throughout the whole range. The Zenith carbureter is supplied by the manufacturer with jets that are cal-



Adjustment positions on the large Rayfield model

culated to cover the needs for the particular instrument. It is not recommended that these be changed. The low speed adjustment is the only one that may need attention and this is taken care of as follows:

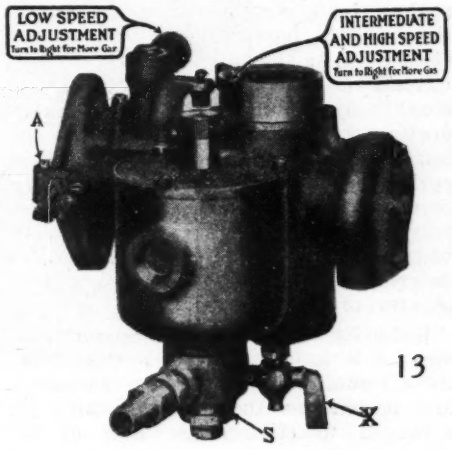
Fig. 10 shows the model "L" Zenith. The low speed adjustment screw O controls the flow of fuel through the idling passage J. "Turning in" the screw O increases the suction and allows more fuel to flow. The manner in which the engine idles gives an indication as to the correct setting.

RAYFIELD CARBURETER

Coming next to the Rayfield carbureter, which is represented by two general types, model "G" and model "M." The model G is shown in Figs. 11 and 12. This is the model employed on several large cars, such as the Haynes and the National. In the illustration the various adjusting screws are clearly shown. This type Rayfield is rather hard to classify because of its construction.

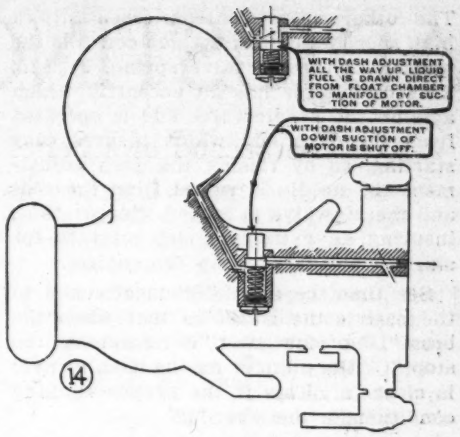
This carbureter uses a metering pin which is lifted as the throttle opens in the main jet through a linkage and so it can be rightfully classified as a metering pin type, were it not for the fact that the Rayfield goes further. An auxiliary nozzle is incorporated in conjunction with a second metering pin which is depressed when the auxiliary air valve opens. Thus, by having two distinct nozzles it can properly be called an expanding type of instrument. This model Rayfield goes one step further in that a dash pot is provided whereby a very rich mixture is furnished for acceleration whenever the air valve is opened suddenly. An added feature of this dashpot is that is prevents any fluttering of the air valve.

The adjustment of this model is accomplished as follows: Starting with the low speed and with throttle closed and dash control down, close nozzle needle H by turning low-speed adjustment N to the left until the block Y begins to leave cam M; then turn to the right about two complete turns. Open throttle not more than one-quarter by advancing lever marked G on steering wheel. Prime the carbureter by pulling steadily a few seconds on lever G (see cut of carbureter). Start engine and allow it to run until warm, then with retarded spark (see lever marked S on steering wheel), close throttle until engine runs slowly without stopping. Turn low speed adjustment N to the left until engine slows down, then to the right, a notch at a time, until the engine idles smoothly. If the engine does not throttle low enough, turn stop screw B to the left until the engine runs as slowly as desired. To adjust the high speed: With dash control down, advance the spark about one-quarter and open the throttle rather quickly. Should this cause the engine to backfire, the mixture is lean. Correct this by turning the highspeed adjustment O to the right, one notch at a time, until the throttle may be opened quickly without causing back-firing. If "loading" or "choking" is experienced when the engine is running under heavy load with throttle wide open, the mixture is too rich. This may be overcome by turning high speed adjustment O to the left. Adjustments made for high speed will in no way affect low speed. Low-speed adjustment N must not be used to get a correct mixture at high speed; it is to be used only when engine



Adjustment positions on the Rayfield model M

is running idle. Before attempting to start, when the engine is cold, open throttle not more than one-quarter, enrich the mixture by pulling up dash control full distance and prime carbureter by pulling lever G a few seconds. To stop engine, pull up dash control, open throttle about one-quarter and switch off ignition. This leaves a rich mixture in the engine to insure easy starting. The dash control, when properly used, will facilitate starting, furnish a richer mixture when the engine is cold, and maintain a correct mixture in the most extreme atmospheric conditions. No changes should be made in carbureter adjustments, as the dash control will take care of cold weather as well as cold engine conditions. Raising dash control enriches the mixture by lifting the nozzle needle, but ordinarily should be down for running. Do not change nozzles, nor alter the float level, as these are taken care of at the factory and are correct. The automatic air valve F should always be seated when engine is throttled down to its lowest speed. The float chamber A and dash AA should be drained occasionally through drain cocks Z to re-


WITH DASH ADJUSTMENT ALL THE WAY UP, LIQUID FUEL IS DRAWN DIRECT FROM FLOAT CHAMBER TO MANIFOLD BY SUCTION OF MOTOR.
WITH DASH ADJUSTMENT DOWN SUCTION OF MOTOR IS SHUT OFF.
14

The internal primer on the Rayfield model M

move water and sediment which may have accumulated. To clean the trap at the bottom of float chamber, remove nut Z. The parts may then be slipped apart and cleaned. When re-assembling these parts be sure that the nut N is drawn up firmly to insure a tight joint. If it is desired merely to drain the trap remove plug S.

The model "M" is a smaller type incorporating the features of the Rayfield Model M without the dashpot. The illustration, Fig. 13, shows this carbureter. Fig. 14 shows the principle of the primer incorporated within the carbureter.

To adjust this carbureter, bearing in mind all the precautions cited previously, proceed as follows: The low speed adjustment is turned to the right for a rich mixture and to the left for a lean mixture. With the engine running idle and the dash control down, turn the low speed screw to the left one notch at the time. Between each movement of the thumb screw, the engine should be accelerated and allowed to come back to its idling speed. In this way a very exact adjustment can be obtained. If the slow speed adjustment is obtained by turning the screw down all at once, a very accurate setting will not be obtained. When this screw has been turned down until the engine manifests a marked falling off in speed, it is a sign that the correct position has just been passed a notch or two. During the accelerating periods, the engine will commence to miss and spit back when the lean mixture is reached. The intermediate and high speed is made accessible by removing the hot air elbow from over the main air valve. It is well to observe a little precaution at this point. The high speed screw should not be moved more than one-eighth turn at a time. This screw produces very effective results in the action of the carbureter and its movement should therefore be correspondingly regulated. The economy of the engine is affected in a very pronounced manner by turning this screw.

SCHEBLER MODEL R

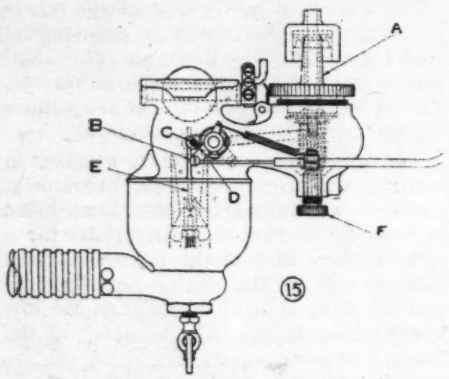
The Shebler Model R is an air valve type. The main or low speed adjustment on this carbureter controls the flow of the fuel through the low speed orifice.

The other adjustment is essentially a high speed adjustment which controls the tension of the air valve spring, Fig. 15. This carbureter has an eccentric which acts on the needle valve and is operated from the dash and which insures easy starting, as by raising the dash adjustment the needle is raised from the seat and the air valve is locked, closed: thus, insuring an extremely rich mixture for starting and heating up the engine.

See that the lever "B" is attached to the dash control "G" so that when the boss "D" of the lever "B" is against the stop "C" the plunger on the dash control is clear in. This is the proper running condition for the lever "B".

To adjust the carbureter turn the air valve cap "A" clockwise to the right until it stops, then turn to the left, or anticlockwise one complete turn.

To start the engine, open the throttle about one-eighth or one-quarter way. When the engine is started, let it run until the engine is warmed, then close the throttle and turn air valve cap "A" to left or anti-clockwise until the engine hits perfectly. Advance spark three-quarters way on quadrant, if engine



The Shebler model R

backfires on quick acceleration turn adjusting screw "F" up (which increases tension on air valve spring) until acceleration is satisfactory.

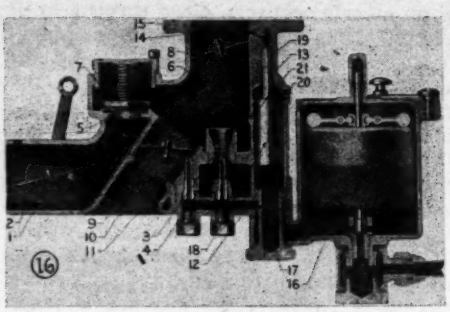
Turning the air valve cap "A" to the right or clockwise lifts the needle "E" out of the nozzle and enriches the mixture: turning to the left or anti-clockwise lowers the needle into the nozzle and makes the mixture lean.

Before starting pull out the plunger "G" which lifts the needle "E" out of the gasoline nozzle and makes the mixture rich for starting and also locks the air valve. As the engine warms up, push the plunger in to obtain best running condition, until the engine has reached normal temperature. When this temperature is reached, the plunger should be clear in.

For the best economy and power, it is recommended that the low-speed adjustment be made as lean as possible.

BALL & BALL CARBURETER

The Ball & Ball carbureter as commonly used on King, Oldsmobile, Mercer and others, is a combination of two carbureters. It would be classified as a compound air valve carbureter, for it uses two nozzles and an air valve. However, it really goes further in that an



Sectionel view of the Ball & Ball carbureter showing the two stages

ingenious accelerating device is employed. Fig. 16 is a sectional view of a double carbureter, showing a vertical section through one side of the instrument. Some of the parts of this instrument have been moved from their normal position, so as to be shown in a single sectional view.

Referring to the sectional view, 1 is the hot air passage of the primary carbureter containing the choke valve 2. 3 is the primary ventura throat connecting the hot air passage with the mixing chamber 6, as shown by dotted lines, and containing the gasoline jet 4. 5 is another fixed air regulating orifice connecting the hot air passage 1 with the mixing chamber 6, and provided with a spring-opposed idling valve 7, arranged to control the air when small quantities only are being used. 8 is a throttle valve of the usual type. The parts so far described constitute the primary carbureter, or first stage.

Referring again to the same sectional view, 9 is an air passage leading from the external air to the mixing chamber 6, and it contains the butterfly valve 10, arranged to control the flow of air through this passage. 11 is a gasoline jet arranged to discharge gasoline into the passage 9, when the valve 10 is opened, causing the gasoline jet 11 to be acted on by the suction of the mixing chamber 6. The air passage 9, with the gasoline jet 11, constitutes the second stage, which is brought into action by opening the butterfly valve 10. A connection between the butterfly valve 10 and the throttle valve 8 (not shown) is so arranged that when the throttle valve 8 is nearly wide open, the further opening of this valve throws the valve 10 wide open. At all other times, the valve 10 is held closed by a spring (not shown).

From the foregoing description, it will be seen that under all the usual running conditions of the engine the primary carbureter, or first stage only, is in service, and the second stage comes into service only when the throttle is thrown wide open for full power. The effect of this arrangement will be described further on.

Continuing the description, 12 is a cylindrical chamber with an extension of 13 of reduced diameter connected by the passage 14 with the chamber 15, above the throttle valve. The chamber 12 is connected with the float chamber 16 by means of the restricted passage 17, so that the gasoline at all times in this chamber 12 stands on a level with the level in the float chamber. 18 is a loosely fitting plunger with an extension 19 on its upper end, forming a piston in the chamber 13. An atmospheric opening, 20, is located in the wall of chamber, 12, and a passage, 21, leads from chamber, 12, to the mixing chamber, 6, through which passage air is constantly drawn into the mixing chamber.

Referring to the several parts that have been described, it will be seen that in the operation of the engine, when the throttle is closed, the vacuum of the manifold acting on the piston, 19, causes the plunger, 18, to rise to its upper position, thus closing the passage to the chamber, 15. The space below the plunger, 18, is now filled with gasoline from the float chamber, and the mechanism is ready for action.

The opening of the throttle, 8, breaks the vacuum in chamber, 15, and releases the plunger, 18, which falls and displaces the gasoline underneath the plunger, causing it to flow into the space above the plunger, where it is quickly discharged through the passage 21 to the mixing chamber, thus augmenting the normal supply of gasoline and causing a rich mixture to momentarily enter the cylinder. This develops a strong pick-up.

If the previous instructions have not been carried out and dirt should lodge on the seat of the needle valve, which controls the flow of gasoline into the carbureter float chamber, the valve will be held open and allow the gasoline to flood and leak out. Light tapping on the side of the float chamber or twisting the needle valve, the upper end of which can be exposed by unscrewing the knurled cap in the center of chamber cover, dislodge the dirt and prevent further flooding.

Dirt may also get into the jets, stopping up the small gaged apertures through which the gasoline is measured to the cylinder, or water may lodge in the feed pipes or float chamber, causing transient difficulties. Consequently, if the engine continues to work, but it does so imperfectly, giving indications of defective carburetion, such as popping back, sluggish pickup, misfiring, etc., the carbureter should be emptied by disconnecting the feed pipe from the gravity tank and taking out the four nuts at the bottom of the jets. Before doing this, however, the shut-off cock in the bottom of the gravity tank should be closed.

The amount of air entering the carbureter is controlled by a butterfly valve (2) in the hot air stove connecting pipe (5), which in turn is operated by the carbureter choke rod handle near the steering column dash bracket. For cold weather starting, the handle should be pulled all the way out, thus fully closing the valve and allowing the engine to draw an extremely rich mixture. Do not keep the handle in the starting position after the engine starts, but push it in about half way and drive in this position until the engine warms up sufficiently to run with the handle all the way in.

Running with the handle UP will overheat engine and waste gasoline.

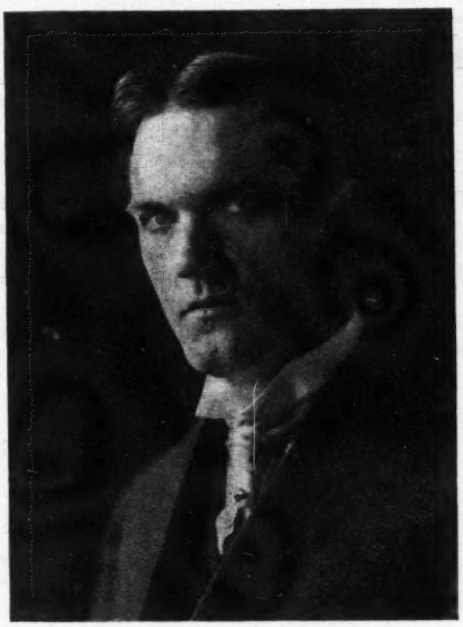
(Article III next week)

SERVICE MANAGERS WHO HAVE MADE GOOD

No. 4 of a Series of Articles Telling Why Some Men Are Holding Their Present Jobs

WHEN the Parrett Tractor Co. of Chicago reorganized a few weeks ago Joel N. Levin was made director of service because he had the necessary qualifications that go to make up an ideal service manager, because he knows not only the mechanical side of the work but understands power farming in all its phases.

Mr. Levin for many years engaged in the cattle business in Texas and in conjunction therewith operated a thousand acre farm entirely with tractor power. When he sold out his interests there he decided to engage in the tractor business because he was convinced that this particular business had before it a wonderful future. He knows farming from practical experience. He knows farm implements, their use and application.



Joel N. Levin, director of service, Parrett Tractor Co., Chicago

He joined forces with a tractor organization, but because he was not in sympathy with their methods of conducting the business he resigned and the next day entered the employ of the Parrett Tractor Company. No particular duty was assigned to him however, he was a free lance. It was his duty to roam about and whenever any matters came to his attention that needed correction he made a report of it.

If there was a particularly difficult service job that baffled the factory service man or the service man of the distributor or dealer, "Joe" as he is familiarly known to all in the tractor industry, got on the train and went out to the job. While riding out to the farm with the tractor owner it was a safe bet that before the tractor was reached he had analyzed the difficulty through adroitly questioning the farmer. He believes that fully ninety per cent of the difficulty with tractors is due to faulty operation.

He is thoroughly conversant with the selling end as well, having had charge of the opening of the Texas territory for the Parrett Company so that he understands the problems which daily confront the distributor and dealer in the matter of service.

Mr. Levin originated and carried out to a successful conclusion the one hundred hour non-stop plowing run during the National Tractor Demonstration, with a Parrett tractor, at Salina, Kansas, in 1918, and the following year he planned and put over the thirty-one day endurance run at the Wichita demonstration, when a Parrett tractor harvested, threshed, plowed and disced a 127-acre wheat field.

A Plea for Cabs and Cushions

"HAVE just read the letter by Max Brown of Tenney, Minn., in MOTOR AGE of April 22 and want to say right here that Mr. Brown has said something in regard to the comforts of a tractor for the driver.

"Mr. Brown has left very little more to say in regard to cabs and comfortable seats on tractors. I own my second tractor and, like the first one, it has the same old hard seat, with practically no spring to it, and no cab. Now just why a farmer that rides one of these machines from daylight till dark should be furnished in this manner is beyond me. Certainly at a very small extra expense the manufacturers could give us these comforts and we would be glad to pay the little extra for the added comfort we received. I have ridden these machines till I was chilled to the bone and the seat of my overalls about worn out.

"You have made long automobile trips and it made you pretty tired, you sat in deeply upholstered cushions. Now, then, imagine how a tractor man feels after riding in a hard iron seat with practically no spring to it all day and every day. I cannot understand why, with the wonderful improvement in farm machinery, the comforts of the operators should be so woefully neglected.

"Are we not human; are we not entitled to a reasonable degree of comfort as well as the office or business man? I'll venture to say the man or men who are responsible for putting the tractor into our hands are not sitting on iron seats and exposed to the elements.

"I do not wish to appear too critical, but would like to drive this matter home to the manufacturers, and I believe at least ninety per cent of tractor owners are with me in this appeal for more comfort and convenience for the poor ones that has to drive them.

What Do We Want?

"I don't know what the other farmers want, but this is what I want and will buy next time, if there is such on the market.

"I want a light, durable cab with plenty of window for light and ventilation in hot weather. I want it roomy enough so I won't be cramped between the seat and levers or other things that might take up space in the cab. I want a wooden floor, as it is warmer than a sheet iron and not so slippery.

"We want a real seat! My idea for a comfortable seat would be the bucket or racing car type, with deep spring upholstering, both cushion and lazy back, and could also be mounted on coil spring. It should be placed in proper relation to the steering wheel as it is very tiresome to lean forward all day to grip the steering wheel or vice versa. This is about all I want for the present, and I think I rightly deserve it, as the farmer puts in long weary days.

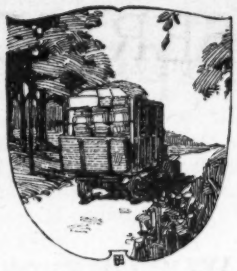
"I sincerely hope other farmers and tractor owners will take this matter up and voice their views, and no doubt we will soon be getting what we want. I don't think the manufacturers would object to this idea of cabs and cushions if the majority of the farmers demanded it, as they would make an extra charge for it, and we would be willing to pay for it. It would mean more work done with more comfort. Come on, tractor buyers, let's demand comfort."—P. H. Lorenz, Hot Springs, S. D.

CAR FIRM CHARGED WITH FRAUDS

Dallas, May 10—Seven charges of embezzlement have been filed here against each of the three officials of the Little Motor Kar Co., who were arrested last month for alleged misuse of the mails. Those against whom charges have been filed are: William S. Livezey, president, R. L. McCoy and George Stricker. It is alleged that they appropriated between $70,000 and $80,000 which was on deposit in two local banks and which represented cash deposited for stock sold. It is claimed that the officials drew checks on the bank account in amounts ranging from $4 to $45,000 and appropriated the money for their own use.

The grand jury has for the past been investigating the manner in which the officials of the company handle the finances for the concern and it is likely that indictments will be returned within a week.

EDITORIAL



Adequate Bookkeeping

ONE of the lamentable conditions existing in many of our present day garages, especially those in the smaller towns, is that the owner or manager of the place does not pay enough attention to the subject of properly keeping books. Very seldom can the manager of the small garage or service station tell exactly the status of any of his departments, which one is making and which is losing money. He does not know from where his profits come, or if he is losing money, does not know where the leaks are, when on the surface it appears he should be making money.

Many make the mistake of drawing money out of the business every week and then using the bank balance to show how they stand. This is of little value unless other things are known. You must know, for instance, what outstanding bills you have, what money is coming to you and the value of your stock. All of this calls for a simple system of bookkeeping, but this is not complete. A simple bookkeeping system may tell you whether or not you are able to pay your debts, but, it will not tell you which department of your business is a producing one and which is a losing one.

If the dealer or garageman does not know enough about keeping books our suggestion is that he engage the services of a bookkeeper who may be willing to work part time. This person can make cross entries to show the accounts of the various departments in addition to the balance sheet, the latter indicating the status of the business as a whole.

The bookkeeping system should be such that the dealer or garage man can tell at the end of each month exactly what earnings the business brought. He may find also that at certain periods of the year his curve of income peaks. The live dealer wants to do better each year he is in business, and the monthly records will tell him when business is falling off. It will tell him more. He can tell which department needs building up. It will enable him to cut down on one department, if necessary, in order to lend a helping hand to another. Thus he will get every department on a money making basis.

We Must Have Accessibility

THE underlying reason why the service man is considered a robber by all the car owners is attributable not to the service man but to the car manufacturer. The service man is an intermediary, so to speak, in the service business. It is true that he renders the service for which he must charge, but the amount of labor that must be performed upon the car is a factor that the manufacturer controls.

There are on the market to-day many notoriously bad designs in this respect. Still, the service man is the edge of the tool, he must bear the brunt of the owner's criticism. When the service man is forced to spend four hours of perfectly good time just to perform an adjustment that could just as well be done in a few seconds if the design were so worked out he is brought to the position where he must charge for something that he cannot explain.

MOTOR AGE stands for accessibility.

There is no excuse for the type of construction that is being put across in this day and age. Manufacturers who have been in the industry since its infancy are as much to blame as others who are just bringing out new designs. The creed of MOTOR AGE in this respect is eventually to see all cars purchased on a service cost basis.

There is to our knowledge one concern in the country, operating large numbers of trucks, who purchase their trucks on a service cost basis. It is hoped that the day will come when all motor car manufacturers will point to their car and say, that one of the talking points of the car is the fact that the total cost of all the service operations is a certain percentage of the car cost.

Ship By Truck

"SHIP-BY-TRUCK Week," which is to be staged throughout the United States next week, should offer a particular appeal to the motor truck dealer who has found considerable resistance to sales in his territory. It has always seemed to MOTOR AGE that the Ship-By-Truck movement should appeal to the small town dealer even more than to the big city man. For there are so many more opportunities in it for the small town man than for the city man.

While the Ship-By-Truck idea originally was sponsored by one big tire concern which still capitalizes,—and rightfully,—on the movement, it has grown into a national affair. Governors of many of the states have officially recognized the movement and designated May 17 to 22 as "Ship-By-Truck" week as for official observance. Mayors of cities and other minor office holders have also taken official cognizance of the movement and have designated it as a local official event.

For the small town dealer, Ship-By-Truck week, with its attendant wide publicity, should offer a wonderful opportunity for demonstration. The truck demonstration tour has become increasingly important and popular in the last two or three years until now it is the biggest means of truck publicity. Combining the popularity of the truck demonstration with the wide publicity attendant upon the Ship-By-Truck movement and you have the ideal combination for overcoming sales resistance.

But the dealer of the larger city should not feel entirely out of it. While the movement is of greatest advantage to the small town man, the big city man also should capitalize on it. He has the resistance of the fact that the ordinary city dweller has seen so many parades and similar "stunts" that he has become blase. But the big city dweller is not blase this year if you can show him that you can reduce the high cost of living for him, and that is just what the Ship-By-Truck movement can do.

April Production Is Cut by One-Third

Switchmen's Strike and Resultant Fuel and Steel Shortage Knock Schedules in the Head

AUTOMOTIVE production in the United States slumped off from one-third to one-half for April compared to the record-breaking totals produced in the preceding month. The rail strike and its resultant shortage of fuel and materials was responsible for the April slump, but there were other factors which probably would have cut into production to a slight extent, even had there been no strike.

Factory officials are rather more optimistic for May work than they are for two or three months ahead. They believe they will be able to get their production figures up to schedule for May, but hold little hope they will be able to continue on schedule for the later months of the year. They look for a material shortage for the rest of the year and believe that this will begin to affect them by June or early July rather than at present when the railroads have not yet made the financial arrangements to take all the steel they will require later for rehabilitation.

Detroit Production One-third Off

Detroit production fell off approximately 33 per cent. The total of passenger cars made in the Detroit district for April was 111,961 as compared with 176,831 for March. Truck production for April was 15,771. These figures include all of Michigan and those of Willys-Overland and Willys-Knight in Ohio.

Before it became known that steel was to be diverted several executives expressed the opinion that the steel shutdown as a result of the railway strike would mean a more serious menace to the industry than the lack of fuel, inasmuch as it would be several weeks before the steel mills could again be in full production.

The meeting of the directors of the National Automobile Chamber of Commerce last week at which the financial situation was taken up and arrangements made for an investigation and relief arrangement was expected to eliminate what appeared to be the most serious factor confronting the industry. The steel situation also is to be looked into by the directors and every effort will be made to prevent any further interference with production to the end that factories may reach as close to the scheduled output as possible.

Although there has been no settlement with the striking switchmen and yardmen, deserting strikers and volunteers are manning trains and freight is moving more freely, not to the extent, however, of insuring delivery of materials and parts and many of the factories are still maintaining truck fleets to bring in supplies which were started when the strike first broke.

The Ford factory, which continued operations when all others in the district were shut down, laid off 26,000 for a full week beginning April 19. Ford had prepared for the fuel emergency and went along on full production for the first ten days of the strike, but laying off this big bunch of men cut production badly in the second half of the month and as a result built only 51,066 cars and 7,179 trucks in the month. This gives Ford a total of 722,915 cars in the first nine months of the fiscal year with a schedule calling for 1,000,000 cars for the twelvemonth.

Packard Output Little Affected

Packard was more fortunate than most plants and was down only two and one-half days through the month. Packard had fuel on hand when the power ban was put on but ran short before power was restored. However, production was affected to only a slight degree.

Maxwell-Chalmers production was curtailed greatly and the plant was practically closed throughout the greater part of the strike period in most departments. In some, however, work was continued and the company was able to hold the greater part of its organization so that when the ban was lifted the employees' roster was practically normal.

Paige-Detroit ran steadily though production was cut considerably, the limitation of 40 per cent of power hampering the factory effort.

Liberty Motor Car Co. was another one which ran throughout the strike on the 40 per cent power basis, holding its organization. Production in the Liberty plant, however, was cut about one-fourth as compared with March.

Oakland was down two weeks, and the same practically was true of all plants in Pontiac. Oakland, however, kept all of its men busy in the body plant and during the last two weeks of April was enabled to bring its production close to the output scheduled for the month. Oakland still is without freight cars and practically everything is being driven from the factory. Materials still are being brought in in truck fleets.

Flint Factories Suffer

Flint factories suffered likewise, and Dort put out but 2000 cars during the month. The Dort factory is more fortunate than others in the fact that it now has twenty-eight freight cars loaded with automobile engines enroute from Pennsylvania. A great majority of the Dorts, however, are sent away from the factory under their own power, it being practically impossible to get freight cars to handle them.

Buick Motor Car Co. was down four days, but managed to get out 10,000 cars, running very close to the scheduled output. Chevrolet lost considerable time as a result of the strike but was enabled to make about 50 per cent of its schedule.

The Overland factory was down nine days, but all efforts were centered in production of Knight cars, with the result that there was an increased production of Knights during the month as compared with March and a great decrease in Overlands.

Hudson-Essex was closed a portion of the time and ran on the 40 per cent schedule for the remainder, cutting production very materially.

Standard Motor Truck Co. was down four days and the same was practically true of Federal, Signal, Commerce, Denby and all of those out in the state.

Indianapolis Production Cut in Half

Production in the Indianapolis district, the second most important center in the industry, was cut to about 50 per cent as the result of the strike. Efforts were made to get supplies of materials and to deliver the finished product by driveaways, but these were only half measures and it is not expected that the factories will be able to get on full production schedule for some time.

However, the Cole Motor Co., through their exceptional efforts at production, despite the rail conditions sent out 850 cars, seventy-five of which went to foreign trade, the remainder to domestic production. The production at the Stutz Motor Co. plant was approximately 375 cars, way below the standard, with manufacturing all upset because of the shipping conditions. Premier, with a rather good supply of material on hands, was able to build and send away during April 201 cars, mostly via driveaways.

The production of the Monroe Motor Company was disturbed greatly, due to the inability of the railroads to get shipments of materials to Indianapolis.

The makers of the Spacke car gave their production for the month and their shipments away as 200, a figure less than half what it should have been had conditions been less abnormal.

In the Chicago district, production also fell off about 50 per cent. The Chicago concerns were not so greatly affected as these in the surrounding cities, such as Racine and Kenosha, where the impossibility of getting either fuel or materials cut production about in half. The Elgin, the leading Chicago passenger car, was almost on normal production, but the Nash, Mitchell and Case companies in Wisconsin were cut severely.

Rebuilt Cars Bring Big Prices at Chicago Show

Average of $1,785 Is Obtained at Annual Trade Association Exhibit

CHICAGO, May 10—Rebuilt motor cars have more than double the value in the Chicago market that they possessed two years ago, according to results shown in the Third Annual Used Car Show of the Chicago Automobile Trade association which closed last year. The show was $1,785, as contrasted with an average price of cars sold at the third average of $885 for the second show and only $808 for the first show.

While attendance at the third show was slightly under that of the second, sales were more than for the 1918 exhibit and the total volume of sales was more than twice as much. Following is a tabulation of the three annual shows:

	Cars sold.	Total sales.	Avrg. price.
First show	219	$177,045	$ 808
Second show	219	$193,775	$ 885
Third show	222	$396,165	$1,785

Higher admissions fee and the fact that in the two previous shows a car was raffled off to buyers of admission tickets while this practice was discontinued this year is held accountable for the slight dropping off in attendance.

The total of sales quoted by no means represents the whole result of the show. While it is impossible to form a good estimate of the sales which may be indirectly traceable to the show, the figures given above cover only cars actually sold in the Coliseum. Trade association officials declare that for every car sold from the floor of the Coliseum, there were at least two sold on the outside, while the list of "prospects" obtained by the exhibitors will greatly increase the number of sales which can be traced to the exhibit.

GOODYEAR TO RUN BUS LINE

Akron, Ohio, May 7—The Goodyear Tire & Rubber Co. on June 1 will start a ten-car motor bus service in Akron with a view to supplanting the present inadequate street car transportation service. The company plans to keep a close check upon the financial success of the venture with a view of eventually offering to the city a municipal bus service to completely supplant present transportation facilities.

JOBBERS IN PLEA TO MAKERS

Buffalo, May 12—Jobbers of New York state, meeting here recently, planned co-operation to encourage manufacturers of automobile accessories to dispose of their products only through the wholesaler or jobber. It was reported at the meeting that many manufacturers, convinced of the economy and efficiency of the selling of their entire production only through jobbers or wholesalers, have definitely decided on such a policy.

Jobbers pointed out that this policy does not menace in any way the retail accessory business. It was said that many small retailers have been able to succeed in the accessory business only through the jobber and wholesaler.

Jobbers from many cities of the state attended the convention, at which foundations were laid for a closer co-operation between the wholesalers of supplies throughout New York state. Convention sessions were held at the Statler.

START ON ECONOMY RUN

Los Angeles, May 7—Eighteen cars left here this morning to compete in the fourth annual Los Angeles Yosemite Valley gasoline economy run. The winners are determined on the ton mileage basis. Accompanying the contestants were about twenty other cars containing officials, the press and dealers. The party numbered 128; the largest ever to make the run from this city by automobiles at one time. Two days will be devoted to the run, the first night being passed at Fresno and the valley reached the evening of the second day. This is the largest number of cars ever entered. Those participating are Briscoe, Premier, Cole, King, Dorris, Templar, Dort, Commonwealth, Metz, Crow-Elkhart, Holmes, Comet, National, Skelton, Overland, Willys-Knight and Stephens.

MOTOR CLUB STAGES THEATRICALS

Chicago, May 10—Members of the Illinois Automobile club staged their first annual "Automobile Follies" for three nights this week at the Aryan Grotto theatre, formerly the American Music Hall. The club is composed largely of dealers and other men identified with the automotive industry and the performers were recruited from among the employees of the establishments along Motor Row. In addition, several professional acts were interspersed in the bill.

That the row has an abundance of "talent" was shown by the excellence of the programme. Those who attended the show in expectation of encountering the crudeness usually associated with amateur entertainments were agreeably surprised by the finished manner in which the bill was run off and it was often hard to distinguish between the amateur and professional acts.

TO HOLD MIDSUMMER SHOW

Lincoln, Ill., May 7—The Logan County Automobile Trade association has voted to stage a midsummer show on the court house square at Lincoln, the county seat, the date to be early in June, conditional upon the weather. There will be a display of automobiles, trucks and tractors. Two days preceding the display, members of the association will tour the county advertising the event. It was believed that such an exhibition would be a good advertising stunt and be helpful to all lines of the motor vehicle industry.

Complete Arrangements For St. Louis Ship-By-Truck Tour

Will Leave St. Louis Next Monday—Robert Lee to Be Commander

ST. LOUIS, May 10—Virtually all arrangements have been completed for the motor tour, which will leave St. Louis next Monday, and it is believed that this city's part in Ship-by-Truck week will be on an even larger scale than last year. Capt. Robert E. Lee, editor of the Auto Review, will be tour commander, and the committee in charge of arrangements comprises C. A. Aldrich, C. A. Cole, L. H. Amrine and R. S. Rauschkolb.

Here is the route, as announced by the Scouts who have made the trip:

Monday, May 17—Festus, Hillsboro, De Soto, noon stop; Bonne Terre, Flat River, Farmington, night stop.

Tuesday, May 18—Ste. Genevieve, noon stop; St. Mary's, Perryville, night stop.

Wednesday, May 19—Longtown, Appleton, Jackson, noon; Cape Girardeau, night stop.

Thursday, May 20—McClure, Ill., Anna, noon stop; Carbondale, Murphysboro, night stop.

Friday, May 21—DuQuoin, Pinckneyville, noon stop; Percy, Steelville, Sparta, night stop.

Saturday, May 22—Tilden, Marissa, Lensberg, Freeburg, Belleville, noon stop; East St. Louis.

ANTIGO, WIS., DEALERS COMBINE

Antigo, Wis., May 10—The Automotive Dealers' association of Langlade county, Wis., was formally organized at Antigo, Wis., following a preliminary meeting held recently. Nearly every dealer and garageman in the county was present and signed the charter roll. Officers were elected as follows: President, W. H. Maxson; vice-president, L. H. Sorenson; secretary, W. L. Hayner; treasurer, P. W. Hathaway; directors: Fred Galligan, P. F. Kelly and W. J. Menting. The object of the association not only is to further mutual interests, but to stabilize the business and better conditions for the buying public. Regular meeting will be held monthly on the first Wednesday.

MAKERS CUT PRICES IN ENGLAND

London, England, May 7.—While motor car prices in the United States are showing a constant upward trend, American manufacturers are starting to cut the prices of cars they are selling in England. General Motors, Ltd., has announced a cut in the price of Buick and Oldsmobile cars to the extent of £70 (about $350 at normal exchange) to be retroactive to Feb. 10. Purchasers of cars since that date will be given a refund on the purchase price.

California Has Real Thing In Its Tractor Schools

Industry Combines Forces With State University in Educational Work

LOS ANGELES, May 9—The series of tractor schools now being held under the combined auspices of the California Tractor and Implement association and the State University of California is one of the best conceived plans for the education of the tractor owner that has been tried out anywhere in the United States.

The plan provides for a two weeks' course in the laboratory, mechanical instruction, supplemented by lectures from lubrication, carburetion and maintenance experts, to be held in any location in California which asks for one, and when the registration is sufficient to warrant it.

To date schools have been held at Healdsburg, Napa and Fresno with average registrations of from 60 to 100 owners in attendance. Every registrant pays a fee of 4 per cent, which goes to defray a part of the expenses of the course. The bulk of the money needed to finance the scheme, however, is furnished by members of the California association which believes a successful prosecution of the plan will be effectual education along operative and maintenance lines.

Service cost, mainly due to ignorance on the part of owners, has been extremely high on the Pacific Coast and the idea of reducing it by bringing education to the tractor owner is responsible for the school idea. The plan had its inception in the mind of George Collins, executive secretary of the tractor association. He enlisted the interest of members and secured the necessary funds and then secured the co-operation of the agricultural faculty of the state university and even interested the State Board of Control to the point where it lent a motor truck for the transportation of the necessary equipment from location to location.

No estimate has been made as to the number of schools which will be held. As many will be given as time permits. The course as outlined now provides for two weeks, but there is a probability of this being curtailed in order that more schools can be held to give the opportunity for more ranchers to get the benefit of the scheme.

Mr. Collins declares the courses merely are bringing the demonstrations to the farmer since the latter will not come to tractor demonstrations. He declares the plan will more than justify its cost by the increased confidence farmers will have in power farming and the greatly reduced servicing cost brought about by a more thorough knowledge of their machines.

SHOWS UP "NATIONAL" SHOWS

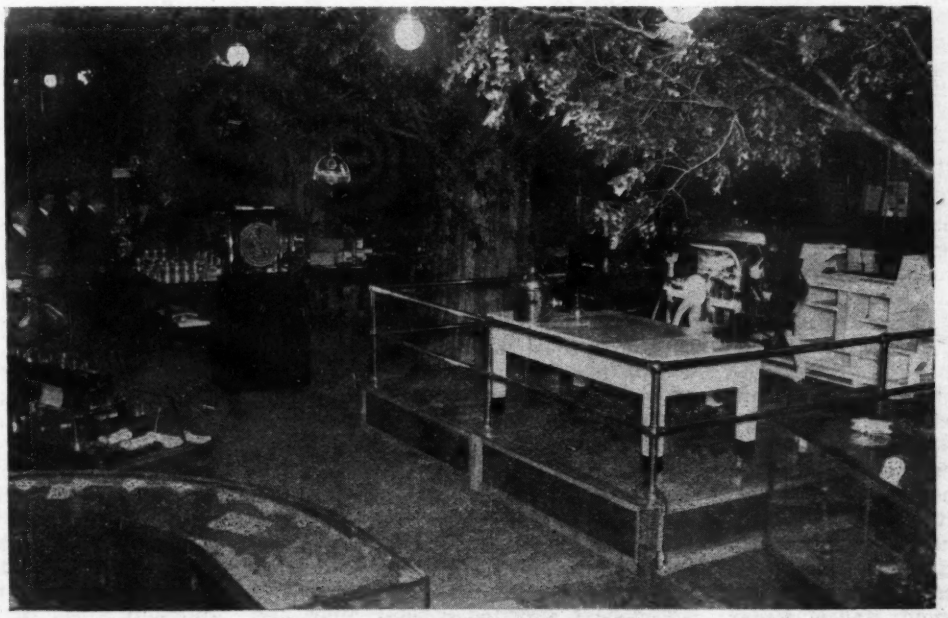
Des Moines, Iowa, May 9—Knoxville, a little Iowa county seat town of 3500 population, recently staged a tractor demonstration which as regards farmer attendance, outdid the national show at Wichita. There were between 1500 and 2000 farmers who saw the demonstration. Fifteen tractors were entered and thirteen completed the plowing. The affair was staged under the auspices of the Marion County Motor Trades bureau.

STORE SHOWS MOTOR ACCESSORIES

Chicago, May 10—One of the most successful and comprehensive displays of automobile fitments and accessories ever undertaken by any firm not actually of the automotive industry was held here this week by the automotive supplies department of Marshall Field & Co., a leading Chicago department store.

Virtually everything was shown at the exhibit except complete motor cars. Special display engines were exhibited by several of the leading manufacturers, including Packard and Cadillac, while the Nordyke & Marmon Co. installed their engine assembly display.

One of the big surprises encountered by the store management is the tremendous demand for automobile trailers in the Chicago market. So great has been the demand that the company is far behind its orders and it has had considerable difficulty keeping even one display car on the floor. Purchasers have repeatedly offered bonuses for immediate delivery of a trailer.



A view of the automobile accessory display staged by Marshall Field & Co., a leading Chicago dry goods store

Four Cities to Be Named for Sectional Tractor Shows

Chicago, Columbus, Kansas City and Los Angeles Expected to Draw Exhibits

CHICAGO, May 9—Chicago, Kansas City, Los Angeles and Columbus, Ohio, loom up as the probable sites of the four sectional National Tractor Shows next year on the eve of a meeting of the show committee off the Tractor Division of the National Implement & Vehicle association here tomorrow. While these cities have not yet been officially selected, their naming is regarded as largely a formality.

San Francisco tractor men solved the vexed question of the Pacific Cost Show by getting behind Los Angeles' bid for the show. San Francisco men decided it was better to support the Los Angeles claim than to risk chance of the show going to some small place through lack of united endeavor by Los Angeles and San Francisco men.

MEMPHIS SHOWS USED CARS

Memphis, Tenn., May 10—The members of the Memphis Automobile Dealers' association have combined their stocks of used automobiles and displayed them for four days commencing May 5. From 150 to 200 used cars were offered for sale. The automobiles owned by dealers will be displayed in a group under a sign bearing his name.

TO HOLD REAL TRACTOR SCHOOL

Boston, May 7—The first real tractor school ever held in New England will be opened at New Hampshire College at Durham, May 18 to 20, inclusive. The principal makes of tractors, each with an expert instructor, will be on hand for the use of the students. Anyone who wishes to learn how to operate a tractor may take the course. The only expense will be the small registration fee, board and room.

In addition to the tractors there will be four or five motor cultivators or tractorettes to show what these little machines can do on a farm. The forenoons will be devoted to class room work and lectures on the principles of construction and operation of internal combustion engines. Experts from the factories will present these subjects. The afternoons will be devoted to field work.

Indiana Farmers Demand That State Halt Road Building Work

INDIANAPOLIS, Ind., May 10—A halt on uncontrolled spending of public money on high priced roads in Indiana is urged by John C. Brown, president of the Indiana State Federation of Farmers, and John R. Riggs, of Sullivan, formerly assistant secretary of agriculture.

The statement is that the good roads movement in the country is swinging to the extreme at a time when road construction detracts material and labor from more immediately necessary needs. Mr. Brown and Mr. Riggs see in the Indiana road building program a prospective expenditure that will equal the cost of seven new court houses for each county in the state and warn against regarding federal aid as merely a gift. Their statement in part follows:

"We all want and need good highways. There may be difference of opinion as to location, kind of material and construction of the same. Because of the war, we stopped manufacturing and transporting road material until our roads are now in very poor condition. The farmers should insist that repair work be done first, so that they can get their products to market and their children to the central or township schools.

"The manufacturers of automobiles, trucks and their allied interests are asking that the trunk lines,—hard surfaced federal highways,—should have first consideration and be rushed to completion, without giving their cost full consideration, and when we say cost, we do not mean the contract price."

MODIFY LOS ANGELES PARKING

Los Angeles, May 9—Important modification of the anti-parking ordinance which went into effect here has been instituted.

The new arrangement permits of parking in the restricted districts for forty-five minutes during the period from 10 a. m. to 4 p. m. The no-parking rule will be enforced from 4 to 6:15 p. m. The streets on which no left hand turns will be permitted have been increased by several additions.

Amendments of the original ordinance were demanded by the business interests in the restricted zones who complained that the two minute parking rule was so stringent that retail business was being reduced by thousands of dollars a day. A protest against the drastic character of the ordinance was made in an automobile parade composed of several hundred vehicles through the downtown district.

ORGANIZE TRUCK LINES

Grand Rapids, Mich., May 10—The Associated Truck lines with fourteen trucks in service are making daily trips over seven routes radiating from Grand Rapids and, plans are being formulated for covering much additional territory now that the roads are in fairly good condition. Service has been maintained throughout the winter between Grand Rapids, Lowell, Ionia, Belding, Byron Center and Wayland. Only three trips were abandoned on account of weather conditions despite the hard winter.

Service to Greenville, Holland, Hastings and Zeeland was discontinued during the snow season, but soon will be resumed. New routes contemplated will touch Muskegon, Grand Haven, Cedar Springs, Howard City, Kalamazoo, Allegan and Otsego.

TO BUILD NEW TEXAS ROAD

Buffalo, May 10—Motorists will be able within the next five years to travel on an all-paved highway between Buffalo or New York and Texas. This prediction was made by Charles Fowler, state highway commissioner of Texas, who was here in conference with George Diehl, chairman of the Good Roads committee of the New York State Federation of Motorists. Mr. Fowler said the money for such a highway has been or will be provided and the work actually completed within five years.

TRUCK RUN TO START JUNE 14

Omaha, Neb., May 7.—June 14 has been set for the start of the First National Motor Truck Reliability contest which is to be conducted under the auspices of the Omaha Bee and with the sanction of the A. A. A. and motor car dealers' associations in the middle west. Charles P. Root, manager of the contest, made the selection of the date and set May 22 as the last day on which entries can be made.

The tour will start from Omaha and all cars must be in the hands of the management there for examination not later than June 5. An earlier date for the start was considered but was abandoned when attention of the management was called to the fact that the Republican National convention would be held in Chicago on June 8, and at that time the papers would be full of political news to the exclusion of all else and the truck run would therefore get little publicity.

STRIKES HIT TRUCK FIRMS

Cincinnati, O., May 9—Strikes of machinists and mechanics in Cincinnati are hampering both motor truck manufacturers and garagemen. According to officials of the two unions, approximately 700 automobile mechanics and half of the 12,000 mechanics in Cincinnati are out on strike to enforce their demands for higher wages. Most of the mechanics are from four large manufacturing plants and from twenty-six repair shops which have refused their demands.

One hundred and seventy-five machinists are out at the Otto Armleder Co. plant. Pickets are stationed at the G. A. Schacht motor truck plant, where a number are out, and half of the force of the United States Truck Co. has been "fired," to use the words of the company, because they refused to sign an agreement not to join a union.

Most of the firms manufacturing trucks and truck parts are on a list of eighty machine tool and manufacturing plants which appear as signers of full-page advertisements in the daily newspapers, declaring that the demands of the machinists for 25 per cent increase in wages, are unjust and "can not be met either in whole or in part."

Cincinnati Motor Men to Push Thoroughfare Improvements

CINCINNATI, O., May 11—A special effort will be made this summer by the Cincinnati Automobile Club to further good roads projects which are of vital importance to Cincinnati, it was announced at the annual meeting of the club this week.

Among the more important projects to which special attention will be given are: Completion of the Dixie Highway from Cincinnati to Knoxville, affording a through route between these two cities; completion of the Sherman-Sheridan highway, a project fostered by the club, which needs only improvement of a stretch near Zanesville, Ohio, to put it in excellent shape; construction of highways from Cincinnati to Maysville, Ky., and Portsmouth, Ohio, in co-operation with organizations of those cities; and the construction of the proposed Federal highway from Cincinnati to Louisville.

Financial contributions were made last year by the club toward completion of the Dixie Highway and representatives will be sent to a meeting to be held at Berea, Ky., as soon as road conditions improve, to urge completion of the route this summer.

The club will introduce an innovation this year by the issuance of the registrations of automobiles in printed forms for public distribution. A small charge will be made to cover the cost of preparing them.

The entire membership of the club, 4900, has been placed under protection of a detective agency and brass name plates are being furnished all members for their cars as a further precaution against thefts.

At the request of several cities surrounding Cincinnati, the club has arranged to organize units or branches of the parent organization in these districts, to furnish them with touring information and other data and to co-operate generally with them in furtherance of their particular interests.

Among the more important achieve-

ments of the club within the last year, according to the annual report, were: Leading the fight which resulted in the elimination of certain objectionable features in the new automobile graduated tax law of Ohio; supporting and indorsing all good roads legislation; breaking up speed traps at Xenia and North College Hill, Ohio; increasing its membership by 30 per cent, 1504 members, within 12 months and establishing a membership bureau to facilitate handling of new memberships, and handling the sale of 33,000 automobile tags in Hamilton County within the past six weeks, without compensation.

OFFER SCHOOLBOYS WORK

Harrisburg, Pa., May 10—High school boys in various parts of the State, notably Greensburg, will be employed at high wages in vacation time, on the State highway building program, it is announced. This is largely owing to the scarcity of labor. The boys will be put to work in the latter part of June and some of them undoubtedly will work through July and August. Wages paid by the State Highway Department are $4.50 a day.

There is an ever-increasing number of motor vehicles traveling on the main highways of the State and comparatively recently more than one thousand big trucks have been installed in the freight-carrying service, most of them by the large rubber companies.

LET PENNSYLVANIA ROAD BIDS

Harrisburg, Pa., May 10—Bids for the construction of fifty miles of durable highway have been let by the State Highway Department at a total cost of approximately $3,000,000. No less than $125,000,000 will have been spent on road-building in the past few years.

Better Police Work Cuts Theft Insurance Rates in Philadelphia

PHILADELPHIA, May 10—Big insurance companies, by agreement, have removed the theft penalty rates for automobile protection in Philadelphia. The action is retroactive to April 15 and will amount to a reduction in premiums averaging $18 a car.

The step is a consequence of increased efficiency of the police department in the last three months in apprehending motor car thieves and the effectiveness of the new State laws governing motor cars.

Penalty charges for Philadelphia have been in effect since 1918, when insurance companies added the "theft penalty" to premiums on cars in this district because of the great number of thefts. Philadelphia motorists were paying an average of $1 more per $100 than New York, or other eastern car owners.

A special "drive" recently has been made by the police department against automobile thefts.

Figures compiled by the Detective Bureau show that thefts for the first three months of 1920 are about one-half of those for the corresponding period for 1919. More cars were recovered in January, February and March than were stolen—accounted for by the fact that 25 machines, stolen before January 1, were recovered, in addition to those stolen after that date.

There were 327 thefts of cars, a total value of $473,736, during the first three months of 1920. Recoveries totaled 352 machines, aggregating in value $518,088.

In the corresponding months of 1919, there were 631 machines stolen, valued at $693,934, and 424 were recovered, whose total value was $528,593.

The record up to a few days ago, since January 1, 1920, shows 433 cars stolen and 484 recovered.

In 1918, 2960 cars were stolen, valued at $2,844,155.44, and 2384 were recovered, valued at $2,575,703.75. In 1919, there were 2610 cars stolen, valued at $2,943,025.44, and 2415 were recovered, valued at $3,195,327.99.

Some of the most active and notorious automobile thieves who were operating in 1918 and the early part of 1919 are now in the eastern penitentiary.

C. H. GURNETT DIES SUDDENLY

Chicago, May 11—C. H. Gurnett, western advertising representative for the Class Journal Co., died early to-day as the result of a recent operation for appendicitis. Mr. Gurnett was widely known as one of the leaders of the advertising division of the industry. He has been associated with the Class Journal publications, with headquarters in Chicago, for a number of years.

DIXIE WAY NEAR COMPLETION

Atlanta, Ga., May 8—The Dixie Highway, at least as far South as Chattanooga, Tenn., is expected to be completed and opened as an all-weather road by September of this year, it is stated by V. D. L. Robinson, secretary of the Dixie Highway association, who is now making an inspection of the Georgia-Florida section of the road.

Mr. Robinson stated that the road through the Cumberland Mountains in Kentucky and Tennessee is in all parts either in process of construction or under contract for immediate work. The association is endeavoring to have the Georgia-Florida section opened at the same time, thus providing a through highway from Chicago and Detroit to Florida.

YOSEMITE ROADS OPEN EARLY

Sacramento, Calif., May 7.—Roads into the Yosemite National Park and the high Sierras, will open this year earlier than usual. There is lots of snow on the higher levels, but it came late and is not packed.

The Wawona road into the Yosemite will open officially May 15, although cars are expected to reach the floor of the valley over this route, by Mariposa, two weeks earlier. The Wawona route coming out by Raymond to Fresno, needs much repairs and will not be open until June 1. The Big Oak Flat road from Stockton should open almost as soon as the Wawona road by Mariposa. The Coulterville road, little used in late years, will be a month later.

The Tioga Pass road, from Nevada into the Yosemite by the way of the Big Oak Flat, will not be open until July 1.

Many New Road Projects Are on Tap in Southern States

ATLANTA, Ga., May 12—With the motor touring season at hand automobile and highway men in all parts of Georgia have renewed their activities for good roads in the South, and virtually all counties are letting road contracts and making plans for road improvements involving in most cases roads which are a part of the national and state system of highways.

Gov. Hugh M. Dorsey of Georgia, has issued an executive proclamation calling attention to "Good Roads Week," May 17-22, and the Georgia Automotive Dealers' association will conduct during that week a state wide campaign on good roads and motor express. "Good Roads Week" and "Ship By Truck Week" are two projects which will be held by the association during the May 17-22 period. During June the association will make a tour of the roads in the peach belt, accepting the invitation of the Georgia Peach Growers to make an inspection of this section while the shipping season is at its height.

The proposed $40,000,000 bond issue for good roads in Georgia is again becoming an active field for discussion and will be one of the chief matters taken up at the annual convention of the association of County Commissioners of Georgia, which meets in Columbus, Ga., May 20 and 21. The bond issue is a part of a bill pending in the state legislature which plans to connect every county seat in the state with improved roads.

Several highway associations have been formed recently to promote roads in various sections of the state. One of the most important of these is the Macon-to-Ocean Highway association, which is advocating an improved highway from Brunswick, on the Atlantic coast, to Macon, which is in the center of the state and on the trunk highways leading from the North into Florida.

Cincinnati Air Dream Was Largely Just Air

Foxy English Slicker Bunks Ohio Dealer Out of New Car With Bum Check

CINCINNATI, O., May 10—Apparently, there's a fly in the ointment so far as Cincinnati's chances to be placed on an aerial freight and passenger route to be established by a $5,000,000 English concern, is concerned.

It developed this week that the Citizens Motor Car Co., of Cincinnati is "out" one Packard automobile and "in" one check for $8,505 which the Park National Bank, New York, on which it is drawn, says is "worthless." The "representative" of the aerial route corporation, a neat looking young Englishman, has disappeared from the scene entirely.

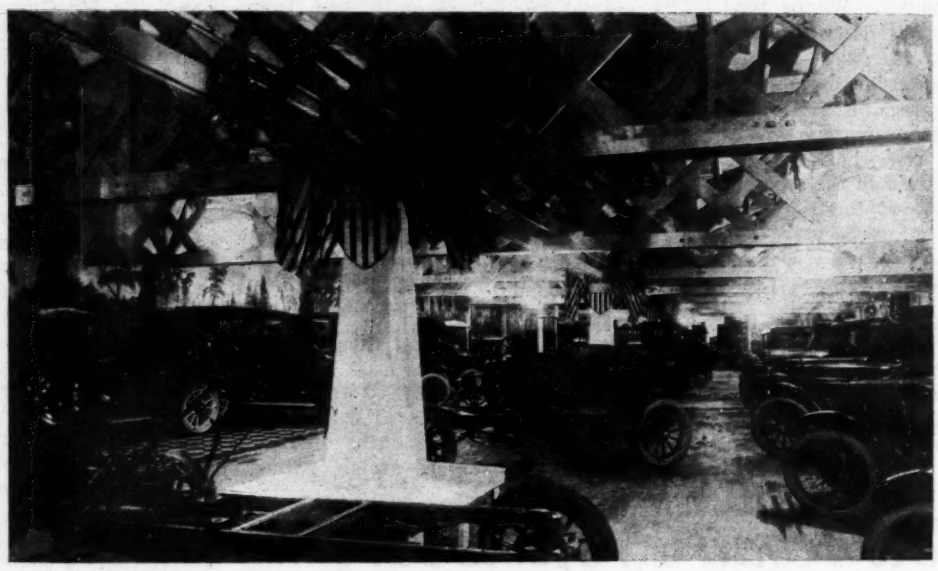
The scheme by which the car was obtained was characterized as shrewd by Cincinnati dealers. The Englishman, with a title of Captain and a string of letters after his Victoria Cross, the name, including the Victoria Cross, the Military Cross, etc., was in Cincinnati several days recently interesting Cincinnatians in the new aerial route, and attempting to sell stock in the company.

Then he went to the Citizens Motor Car Co., presented a check for $10,000 on a Canadian bank and sought to buy a Packard car. The check was turned down. He wrote another for $8,505 to cover the cost of the car and agreed to an arrangement for a mechanic to accompany him to Washington, D. C., before the car was turned over pending a report on the check. For two days the two were together. In Washington, at breakfast at a restaurant, the Englishman pleaded illness and started to his hotel. The mechanic followed. Reaching the hotel, he jumped suddenly into the machine, which had been brought out on a pretext, and disappeared. The check was later found to be worthless.

MANY CASES OF OVERLOADS CITED

Hartford, Conn., May 7—Evidences of gross overloading of trucks have come to the attention of the state highway commission of late, especially since the railroad strike. Twenty-four hours after the strike was on Connecticut roads were called upon to sustain a great deal of extra heavy travel. This broke down many of the roads and the cost to the state will be considerable. The point has been raised that it is nothing short of a miracle that the older bridges have held up under this heavy strain. These old timers for the most part are limited to eight tons and the five ton trucks as a rule put considerably more stress than this when passing over a bridge.

A home case of the flagrant type is that of a contractor who had run a steam shovel weighing about eighteen tons from Southington to Plainville. Then the commissioner ruled him off the road. The owner of a heavy hoisting engine called up the commissioner and asked permission to convey the equipment from Bridgeport to Springfield. The load was far in excess of the limit of ten tons, so the contractor had to use a freight car. A truck owner hauling stone for the Berlin pike new concrete road had a seven-ton load on a five-ton truck, and the highway commissioner ruled him off the road. A strict watch is being kept on trucks to guard against overloading.



A view of the recent show at Great Falls, Mont., one of the largest of the year in the Far West

STREATOR DEALERS ORGANIZE

Streator, Ill., May 7—The dealers in motor vehicles here have organized the Streator Automotive Trade association and new officers have been elected as follows: T. O. Solon, president; J. S. McCann, secretary; L. C. Mulford, treasurer. Twenty charter members were secured and it is hoped to increase this number to thirty, all firms handling all kinds of motor vehicles, accessories and supplies and also repair shops, being eligible for membership. It was voted to affiliate with the state and national associations. The organization of the Streator association was promoted by F. Z. Zillman of Chicago, secretary of the Illinois state association. Meetings will be held fortnightly.

New Aircraft Shown At San Francisco Exhibit

Several Planes Not Displayed in New York or Chicago Are Introduced on Coast

SAN FRANCISCO, May 10—Several airplanes not exhibited at New York and Chicago were seen at the San Francisco Aeronautical Show, which has just closed here. They were products of the Boeing Airplane Co., of Seattle, and the Loughead Airplane Co., of Santa Barbara, Calif. Other exhibitors, whose models were on view at the earlier shows, were Aeromarine, Curtiss, Dayton Wright, Martin, Goodyear, while the Fowler Airplane Co. exhibited an English Avro.

The Doeing company exhibited a model called the B. B. L.—6, having a wing spread of 45 ft., and an overall length of 26 ft. The plane was powered with a Liberty engine, having a maximum speed of 110 m.p.h., and was designed for a ceiling of 20,000 ft. It will be utilized for passenger carrying flights between Spokane and Seattle, and in the Mount Rainier district. The company also exhibited 18-ft. seasleds powered with Sturtevant engines.

Loughead exhibited a two-seater having a wing spread of 28 ft. that is designed for sale at $5000. It has a monocoque body and is operated by a 25 hp. engine developed by the Loughead engineers. The model also includes a new feature, recently tried out by Allan Loughead, in which the lower wings are combined for use as ailerons.

Goodyear's exhibit consisted of a new "pony blimp" similar to that shown at New York and Chicago, but powered with a Lawrence radial engine mounted as a tractor. Formerly the power was delivered by an Ace engine mounted as a pusher.

TO HELP HIGHWAY TRANSPORT

Columbus, O., May 8—Underwriters of liability insurance on motor truck cargoes have taken up the question of making changes in the policies in order to stimulate motor truck transportation. It is contended by owners of truck lines that the present policies provide for unreasonable rates and have other features which are unsatisfactory.

Chicago Garage Owners Grant Wage Increase

Forestall Any Dissatisfaction by Improving Working Conditions for Employes

CHICAGO, May 9—Chicago garage owners have anticipated possible demands by their employees by recommending to all members of the Chicago Garage Owners' association the adoption of a sixty-five hour week. Besides this, the standard committee of the association has listed a recommended minimum wage scale for various classes of employees which is expected to be adopted by all members of the body. The C. G. O. A. is the oldest garage organization in the United States and comprises nearly all leading establishments in Chicago.

Heretofore it has been customary to let each individual owner set his own rates of payment and as garage labor is at present unorganized, this was easy when labor was plentiful. Since labor has become scarce, however, the wide variance in pay scales has resulted in a bad situation for the owners, employees always being dissatisfied even when well paid through a belief that they might be able to get a little more money somewhere else. While the minimum scale is not in any sense obligatory upon members of the association and in most cases employers are already paying considerably in advance of this scale, it is expected to stabilize the market.

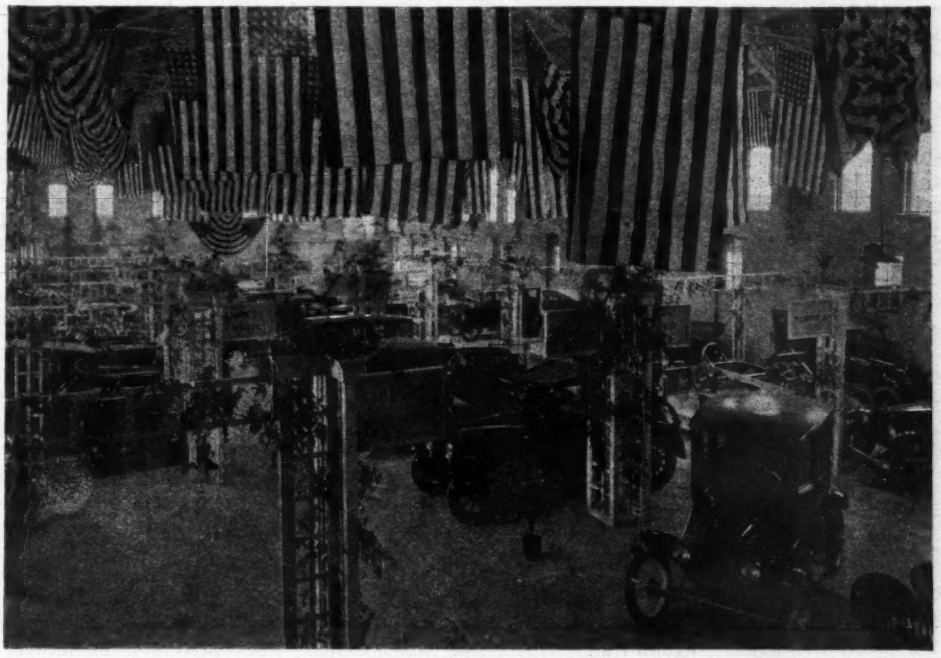
The minimum scale adopted is as follows:

Charges, $35 per week.
Washers, $30 per week.
Floormen, $25 per week.
Polishers and Cleaners, $25 per week.
Hikers, $22 per week.
Combination washers, floormen, etc., $30 per week.

Before the present shortage of labor, the average hours of employment for garage workers is said to be about twelve hours per day, and rates to customers were based upon this figure. The new sixty-five hour week is, of course, optional to members of the association, some of whom have already reduced their working hours lower than this total. The garage worker's week, of course, is a seven day week and under the new scale, a week would consist of six full days with one-half holiday each week or seven full days with one full day off each alternate week.

Many of the garages in Chicago have already made concessions to their employees far beyond what is recommended by the Garage Owners' association. The average rate of pay for car washers in Chicago, for instance, is between $35 and $40 per week while in some cases especially good men are getting $45 and $50 a week. For other classes of garage work, the pay is proportionately above the minimum scale suggested.

The Petersen Garage, one of the largest on the south side, has gone far beyond the association recommendations. It has reduced its working hours to a six day week of nine hours per day and has adopted a wage scale above the minimum recommendation. As a result, storage and garage service rates have been raised to a slight extent but not to any material extent.



A view of the show recently held at Wilmington, N. C., said to have been one of the largest and most successful ever held in the South

TO BUILD EXPOSITION BUILDING

Minneapolis, May 10—Plans are being drawn for an exposition building for Minneapolis larger than any industrial exposition in the United States. It will have 300,000 sq. ft. floor space and will cost $600,000. The Minneapolis Exposition Co. will be formed and the building will be completed in time for the fall and winter shows. The building will be two stories. It will be erected on the industrial district tract adjoining the warehouse of the eight big tire companies of the country. The project was launched by the Northwest Tractor Trade association and has nothing to do with and does not conflict with a proposed municipal auditorium. The building site is on a 200 foot boulevard and is reached by trolley lines.

Six more tire and rubber companies having begun negotiations for space.

Water Shipments Aid In Transport of Motor Cars

Barges Along Mississippi and Ohio Will Supply Southern Dealers This Summer

LOUISVILLE, May 10—Barges containing a cargo of 490 automobiles, towed by the steamer Sprague, the most powerful river steamer in inland waters, passed through the canal at 1 o'clock yesterday afternoon on the way to Cincinnati. Rivermen hailed the event as an omen of the revival of river traffic. The Sprague left St. Louis Sunday morning with its annual cargo and is due at Cincinnati to-day.

The cars were shipped by water because it is cheaper, faster and because the car shortage is acute, members of the crew asserted. It is estimated that it would have required more than 100 railroad cars to handle the shipment.

The boat will pick up a cargo of 400 automobiles at Cincinnati for shipment to Memphis and return to St. Louis for another consignment. Members of the crew said a revival of river traffic in the Mississippi has reached a point little dreamed of by rivermen several years ago. Hundreds of barges and boats are being constructed to take care of increasing traffic, they said.

The boat is owned by the Aluminum Oil Co., East St. Louis. Both the steamer and the four barges of the two are constructed entirely of steel .

The automobiles in the Sprague's tow are Chevrolets. This car is manufactured by a Michigan concern, but those shipped to Cincinnati for distribution there were assembled in St. Louis, it was said.

TWIN CITIES TRUCK MEN BAND

Minneapolis, May 10—Motor truck dealers plan an association in the Twin Cities incident to meetings to arrange for the Truck-Good Roads tour beginning May 17. The committee to arrange for the association are Harry I. Dafoe, J. A. Donnelly and P. S. Wells. Thirty-eight distributors have entered for the tour which starts at 8 a. m., May 17, from Minneapolis and ends at 5 p. m. May 22 in St. Paul. J. A. Deerwester is tourmaster.

Standard Specifications on Motor Car Fuels as Issued by Government

WASHINGTON, May 7—Specifications and tests for lubricants adopted by the Committee on Standardization of Petroleum Specification which became effective April 16, were made public this week by the Bureau of Mines, Department of the Interior. This committee, which was appointed under the authority granted in an executive order of July 31, 1918, has found it possible to coordinate and standardize specifications drawn up by various departments and agencies purchasing lubricants. They have eliminated some tests of doubtful value and made an effort to simplify and harmonize the wording of the specifications.

The work of this committee is by no means complete. The Technical Sub-Committee, which has held several meetings with manufacturers and consumers of lubricants, will hold special sessions within a few weeks to discuss further specifications for petroleum products. The standardization committee has not been too stringent in their regulations, but has allowed the refiners great latiture in their choice of crude oils. Their work, however, has, to a large extent, abolished conflicting specifications of federal departments and agencies purchasing petroleum products. One of the chief results of the committee's investigation has been to group a large number of oils in three classes. Under their tests, Class A comprises oils suitable for ordinary engine and machine lubricating; Class B, oils for high-speed engines, turbines and dynamos, where an emulsion test is required; Class C comprises oils suitable for gasoline engines, motor cars, and air compressors, also oils which can be used as extra high grade turbine and dynamo oils. It is claimed that the oils of Class C meet requirements for carbon residue as well as emulsification tests.

The grades are determined according to viscosity. The three classes of oils are divided into five grades, which in Government purchases, will be known as extra light, light, medium, heavy and extra heavy. Special oils and greases are cared for under other specifications.

The committee calls attention to the fact that the specifications have been drawn on the basis of lubricating efficiency without reference to the sources of the oil. Their purpose in making this allowance to refineries was attributed to the fact that further experimentation in lubricants must be encouraged.

CAN'T SELL CINCINNATI TRACK

Cincinnati, O., May 9—No bids were received for the Cincinnati Speedway, at Sharonville, when the property was put on the auction block in the sheriff's office, under a court order, for sale.

It had been reported that the bondholders would buy in the property and attempt to stage races in an effort to satisfy their claims for $200,000, the appraisal value of the property, but H. S. Leyman, former president of the Speedway company, said the appraisal price was too high and they were unable to get together for the purchase.

The bondholders will ask a new appraisal before the property is again offered for sale. The track represents an investment of $700,000, of which $500,000 is in stock and $200,000 in bonds. The stockholders will lose their entire investment, since the sale price is certain to be less than $200,000, the indebtedness of the bondholders.

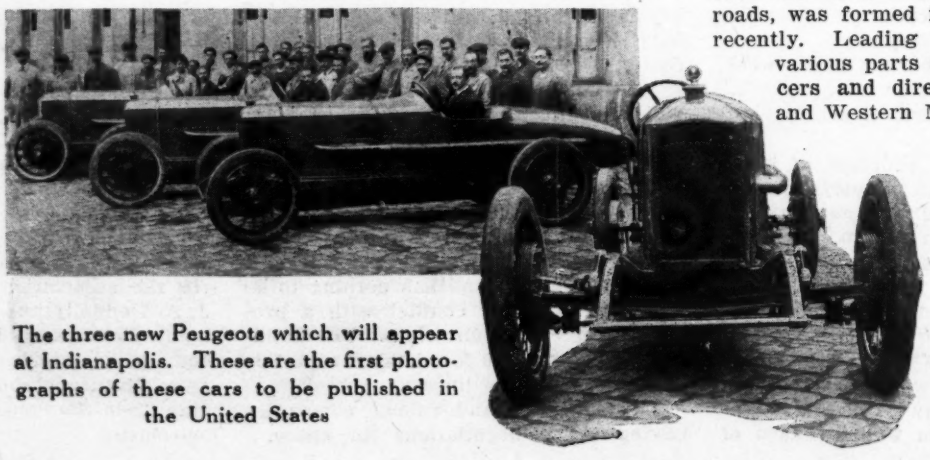
ST. LOUIS USING RIVER SHIPMENTS

St. Louis, May 12—Between St. Louis and New Orleans is a government-controlled barge line, and freight is being moved by the barges for through shipment to New York and the Atlantic Coast and to South and Central America and to the Pacific Coast and the Orient via the Panama Canal.

This service is being used by the Moon Motor Car Co., which is boxing motor cars in its factory in St. Louis, loading them on the barge line and shipping them direct to South American points. The General Motors Corp. also is expected to take advantage of the barge line.

PENNSY TO GET NEW SPEEDWAY

New Kensington, Pa., May 7—A mile and a quarter automobile speedway is to be erected here by the Allegheny Valley Fair and Racing association. It is expected that the course will be completed in the fall but, in the meantime, a dirt track will be laid out for minor races during the summer. The fair promoters state that an airplane passenger service will be instituted between New Kensington and Pittsburgh, 18 miles away.



The three new Peugeots which will appear at Indianapolis. These are the first photographs of these cars to be published in the United States

CARD RELIABILITY RUN

Sacramento, Calif., May 10—The annual reliability run of the San Joaquin Automobile Trades association, from Stockton to the Yosemite National Park, has been set for May 27. The run this year carries a return trip, so both start and finish will be at Stockton. The date selected is that when the delegates to the Pacific Coast Ad Club convention will be taken into the Yosemite Valley.

NEW PEUGEOT BUILT HERE

New York, May 8—Peugeot's racing team for the Indianapolis sweepstakes on May 31, will be increased to four, with the addition of Ray Howard who will drive a Peugeot rebuilt in this country under the direction of Alphonse G. Kaufmann, president of the Peugeot Automobile Import Co., New York.

ENTRIES OPEN FOR UNIONTOWN

Uniontown, Pa., May 7—Entry blanks have gone out for the Universal trophy race, marking the fourth annual grand opening event, at the Uniontown Speedway on Saturday, June 19. The distance will be 225 miles and the cars will be 183 cu. in. displacement.

TRAFFIC SHOWS WEAK BRIDGES

Wilmington, Del., May 7.—Delaware made the discovery, during the recent railroad strike, that if it wants to encourage heavy motor traffic, it must strengthen some of its bridges. Several bridges were broken by heavy trucks used on local roads during that emergency, because they were not equal to the strain. All are being replaced by stronger structures and in the future there is likely to be no difficulty, though some roads may be barred to real heavy traffic. There will be ample highways through the state, however, for all traffic, no matter how heavy.

FORM MISSOURI ROADS BODY

Kansas City, May 8—A good roads federation of Missouri, to assist in putting over the bond issue of $60,000,000 for roads, was formed in Excelsior Springs recently. Leading business men from various parts of the state are officers and directors. Kansas City and Western Missouri are particularly well represented. The president is Harry G. Hawes of St. Louis, author of the Hawes' good roads bill. W. S. McLucas, president of the Commerce Trust Co. and president of the Chamber of Commerce of Kansas

City, is vice president. Mr. McLucas is an enthusiast over practical steps to promote road building; the chamber has recently endorsed a project for raising $100,000 for the road-promotion program of the Good Roads Association of Greater Kansas City. J. Frank Smith, manager of this Greater Kansas City road organization, represents the Fifth congressional district in the state federation; Estel Scott, president of the Greater Kansas City organization, is also a director, as if C. F. Adams, Chillicothe motor car dealer, president of the Associated Highways of America.

PLAN TRANSPORT CORPS TOUR

Washington, May 7—Plans for the transcontinental tour of thirty trucks operated by the Motor Transport Corps are now before the Chief of Staff, United States Army, for his approval. It is expected that authorization for the trip will be given this week and the itinerary finally determined.

It is quite certain that the trip will be made from the Bankhead Highway to the Pacific coast. The company will be at full war strength and will take about two months in crossing the continent. The roads, in many of the states, are in bad condition, according to reports received here. The maps show that in many places it will be necessary for these heavy trucks to use trails. It is under such conditions that the supreme tests will be made.

CLUB HELPS IN STRIKE

Toledo, O., May 8—Toledo Automobile club, 4500 strong, batted 1000 in the street car strike, which ended recently, with its hearty co-operation in the effort to get employees to and from their work, and in giving the riding public the best service possible under the circumstances. The near-blizzard, which hit this section, crippled the bus line service established by jitneys and public automobiles, and thousands of persons were compelled to walk.

Mayor Schreiber sent out an appeal to the Automobile club to lend its aid, but the club had anticipated his wishes and already had voted to throw its strength to the side of the public as against the strikers and the street car company. The result was that since Sunday the situation had been greatly relieved, and the action of the club, it is believed, made the company very willing to abide by the decision of Federal Judge Killitts ordering it to restore service to-day and pay strikers the wage demanded.

Government is Conducting Experiments on Motor Car Fuels

WASHINGTON, May 10—It is apparent that the United States Government is gradually awakening to the fact that the scarcity of fuel for engines is a very formidable problem. The ever increasing demand for gasoline, and unsuccessful efforts to increase the supply from the source has revealed to the Government the necessity for development of substitutes. To this end various chemists' organizations connected with the Government departments are now devoting their attention to the production of gas from straw.

At Arlington, Va., just outside of Washington, a corps of specialists are constructing special equipment to conduct experiments in this heretofore unexplored field of scientific research. While the construction work is under way expert chemists are making a special study of the undigested mass of laboratory reports assembled from all parts of the world. It is quite true that the results so far are insufficient to presage an epoch in fuel production, notwithstanding the fact comparatively encouraging results have been obtained from laboratory experiments in Canada and in other parts of Great Britain. The Government chemists and others interested in this development of a gasoline substitute are apprehensive as to the outcome of their experiments.

Washington chemists have taken advantage of the experiments and actual road tests conducted in London, and at the University of Saskatchewan at Saskatoon, Canada. It was here that Prof. McLawrin showed the infinite possibilities of using straw gas in the operation of tractors in the Great Northwest. He purchased two huge gas bags from traction companies in London. These bags were used as containers for commercial gas which was used to operate motor vehicles in London, during the gasoline shortage of 1917 and 1918. Now, as then, the chief difficulty of this method, is compression. The gases take up too much space for economy. The average run of motor vehicles operated by this means has not exceeded 15 miles. The cost of replenishing the gas supply several times a day is too excessive for ordinary use.

The equipment now being installed at Arlington will permit destructive distillation of straw, for the purpose of producing a gas, on a large scale. If the results warrant the expenditure of more money, assurances have been given by congressional committees that appropriations may be had on application. The Government chemists expect to have at least one retort, scrubber and gaso engine at work within a month. The officials directing the erection of the new plant have been close students of this new process for several years. They have on hand copies of Prof. McLaurin's laboratory experiments and have also accumulated considerable data on the test made in European countries.

The Government officials who are lending their aid to this important research believe that it can be carried out successfully in a small way in the great farming communities. It is believed that the large amount of straw which usually goes to waste, or, at least is used for bedding, investigation shows that thousands of tons of straw are annually destroyed by farmers in the Northwest and other territories where the chief yield of the soil is grains. Scientists know for certain that gas can be produced from straw. If some method can be devised which will permit the transportation of this gas in a compact form, it is quite certain that automotive engineers, especially those interested in tractors, will also find themselves with a problem to solve. This straw gas in its chemical compression is similar to coke gas used for heating and lighting purposes. Experiments show conclusively that there is sufficient air in straw gas to eliminate the carbureter. In all tests conducted on stationary engines it was found necessary to close the air intake. In its explosive qualities the new gas compares favorably with other fuels. Straw gas, it is said, runs close to 400 B. T. A.

Straw costs practically nothing in the great agricultural districts. The expenses of drilling and refining which must necessarily come with the production of gasoline are eliminated in the manufacture of this substitute. From 10 to 12,000 cubic feet of gas has been produced from a ton of straw. In actual tests charges of 200 lb. of straw have been made with gas being produced within an hour.

Gene Walker, star rider for the Indian motorcycle, with which he set many new records recently at Daytona Beach, Florida

The suggestion has been made that this substitute would be more fully utilized in farming communities. The reason for sectional uses would be in the interests of economy, because the research is new in its initial stage, it would be well nigh impossible for an individual to produce sufficient gas for tractor purposes at a low cost. But, with the establishment of a community gas plant in farming districts production costs would be cut to a low figure. The question of storage is one which the communities would have to solve, as it would be difficult to maintain a reserve supply under existing conditions, provided a method is devised for compressing this gas. The community gas plant is bound to come, according to the opinions expressed by scientists here.

MANY TRAFFIC RULE VIOLATORS

Minneapolis, May 10—Enforcement of the rules of traffic in Minneapolis by means of extra motorcycle and 125 special automobile and foot officers is bringing into the net as high as 1,700 persons in a day. Drivers became so lax and there were so many serious and often fatal accidents as a result of the indifference of car drivers that the superintendent of police directed a campaign of strict enforcement. Passing at the left side of trolley cars and passing the gates of unloading street cars, stand up well with fast driving and leaving victims of collisions lying without aid in the character of offense.

Only a few of the serious offenses result in court action. Lieutenant John Hart, in charge of traffic, reprimands those who allow their lights to go out, who violate the dimming ordinance and some of the speed paragraphs. Those who are taken before the municipal judge are numerous enough, however, to put the city docket back several days. Workhouse sentences and fines as high as $20 are being handed out.

PAY WORKERS ON HOURLY BASIS

Macon, Ga., May 10—The Macon Automobile Dealers association at the biggest meeting in the history of the organization, tonight, voted to pay all workmen in their shops on an hourly basis in the future. They also voted down a proposal to close all establishments on Saturday afternoons during June, July and August. Most of the dealers declared that this was the day of all days during the week that automobile shops should be kept open, especially for the farm trade, which comes from a radius of fifty miles of this city, covering a population of 800,000.

LOCAL TAXES FOR DELAWARE CARS

Wilmington, Del., May 7.—The Delaware legislature has passed an act which makes it possible for the Wilmington city council to impose a local tax on vehicles, including motor cars, in addition to the state tax. It was thought this might affect non-residents operating cars here, but such is not the case. The bill is still being fought, however, some of its opponents trying to have Governor Townsend refuse to sign it.

Kansas City Dealers Form Association to Meet Credit Crisis

KANSAS CITY, Mo., May 10—"The Automobile Financing association" has been organized in Kansas City by twenty-five of the thirty motor security companies which handle purchasers' paper. The purpose of the association is to improve conditions under which such paper is issued, and to standardize terms. The suggested terms announced at a meeting of the Motor Car Dealers' association May 3, were 50 per cent. cash payments, and eight months' time on passenger car paper, 40 per cent. payment on trucks and time of sixteen months. After the present temporary stringency passes, passenger car payments may be reduced to 40 per cent, and truck payments to 33 1/3 per cent. Financing company representatives suggested six months' time as advantageous, since then the company could finance two sales a year for the dealer with the same money. The intimations of the financing companies that they were discovering the exact costs of overhead and of rendering service to the dealers, and the well known advances in interest rates, give the impression that the cost of financing will be higher.

Urge More Careful Financing

The financing companies urged dealers to be more careful as to references on buyers—many dealers, it is said, seem inclined to shift to these companies the notes of buyers which the dealers themselves would not accept or endorse. It seems possible that there may be far closer co-operation in the scrutinizing of risks, and the liability on notes, among dealers, financers and the bankers who accommodate the security companies.

Federal reserve bank officials and other bankers have insisted to the motor industry, that this industry is not being singled out for loan-curtailment. Governor Miller of the federal reserve bank explicitly states that the bank is scrutinizing all paper closely, even agricultural and commercial paper. Bankers assured the motor car dealers May 3, at a large meeting attended by many guests representing various phases of the industry, that curtailment in business and profits was necessary in every industry; and that co-operation towards reducing credits would soon work out a solution of the emergency. The bankers declared that they realized the necessity of the passenger car to society and business; but that dealers should be careful to sell, under present conditions, only to men who could afford cars, and would need them.

CAMPAIGN TO STOP SPEEDING

Indianapolis, Ind., May 12—Speeding on the streets of Indianapolis must be stopped. That is the word which comes from Police Chief Kinney and Criminal Court Judge Collins.

Several persons have been killed in the past several days by wild drivers, the succession of deaths coming to a climax when one of two taxi drivers, racing about the Circle, around Indiana Sailors' and Soldiers' Monument, the civic center of the city, ran down two nuns, teachers in an Italian school, killing one of them.

The taxi drivers were driving, according to witnesses, at an excessive rate of speed. Foot traffic on this street is always heavy. The public, which has been more or less apathetic to this wild driving, and the deaths resulting from it, seemed brought to its senses with this latest accident, and demands are made that the authorities stop it all. According to the police, both these drivers are ex-convicts. Both were arrested.

PROTEST GEORGIA OIL FEES

Atlanta, Ga., May 8—The Oil Department of Georgia has been made defendant in a suit filed by the Texas Oil Co. which seeks to prevent the state from collecting oil fees in excess of the actual cost of inspection. The Texas company alleged that the state, in collecting overplus fees, was operating in violation of the United States and the State constitutions.

A temporary injunction was granted in the United States District Court to prevent the State from collecting fees for inspection, but this stopped the inspections and consequently the sale of the oil so an agreement was reached to place the excess collections in trust until the court disposes of the suit for permanent injunction, which will be heard within a few weeks.

JAIL SENTENCE FOR LICENSE VIOLATOR

Detroit, May 10—Arthur L. Holmes, wealthy owner of the Arthur L. Holmes Lumber & Fuel Co., was sentenced to serve 60 days in jail without option of paying a fine upon conviction of driving his automobile while his driver's license was under suspension. Several charges of traffic law violation have been made against Holmes, one of which charged him with operating his car while under the influence of liquor. His license was suspended, but despite this he drove his car to the court-house to answer a charge pending against him. He was scored by the judge in assessing sentence.

TAKES ON AIRPLANE SALES

Omaha, Neb., May 7—The Western Motor Car Co. of this city has taken the agency for the Curtiss airplane for the western territory. The company is one of the first in the west to take on aircraft in addition to motor cars.

MUCH BUILDING IN SACRAMENTO

Sacramento, Calif., May 7.—Automobile dealers and garage men of Sacramento will spend $1,000,000 or more for new business homes this year. Many of these buildings are completed, some are under construction, and plans for others have been announced.

Among the biggest improvements are these: Don Lee, Cadillac and Maxwell agent, new sales building, $350,000; Brown Motor Sales Co., $50,000; W. I. Elliott Co., handling the Chevrolet, Franklin and Scripps-Booth, $75,000; Earl C. Anthony, Packard agent, $100,000; J. J. Jacobs, Studebaker distributor, $35,000; Moeller Brothers, Ford agent, $75,000; G. E. Harvey, $20,000; Henry Spring Co., Mitchell distributors, $100,000; Goodyear Tire & Rubber Co., $40,000; United States Rubber Co., $20,000.

Permits for private garages are averaging about 10 a week, and the year's total, based on the first three months, will be $150,000 for this class of construction.

O'MALEY OFFERS PRIZE TO BOYS

Kansas City, Mo., May 7—As a stimulant to farm production, the G. T. O'Maley Tractor Co. has offered prizes to students in the vocational agricultural courses in the state high schools and will give a Fordson tractor and Oliver gang plow to the winner of the contest. Each boy must grow at least five acres of corn, become a member of the Missouri Corn Growers' association, and show at least one bushel of corn at the Missouri State Corn Show. Standing will take into consideration yield, profit per acre and quality of corn.

GIVE ENTERTAINMENT FOR HOMES

Boston, May 10—In order that girls employed in the automobile district of the Back Bay may have a cottage this summer where they may go for a rest the Detinu Setats club gave a minstrel show and dance last night in Brattle Hall, Cambridge, under the direction of Frank Flynn and Al Pezant Bagdazarian, two former Naval men.

The cast included about 50 men and women employed by Back Bay automobile concerns. Proceeds from the affair will swell the fund with which to hire the cottage.

CALIFORNIA GAS AT 25 CENTS

Los Angeles, May 11—Reports are current here that the price of gasoline will be advanced 2 cents per gallon within a short time. It now retails at 21½ cents per gallon and, according to reports, will be 25 cents before the summer passes. With distillate largely withdrawn from the market and a higher price of gasoline the cost of operating motor vehicles is certain to advance. However, it is not believed by dealers that the higher cost of fuel will have any material effect in slackening the demand for cars.

CAN COLLECT LOCAL FEES IN PENN.

Uniontown, Pa., May 7—Boroughs and cities may collect borough or city licenses from taxicabs operating within the corporate limits, according to a decision of Judge J. Q. Van Swearingen, in common pleas courts here, upholding the contention of the borough of South Brownsville, which has assessed a fee of $10 for each taxicab operated.

Programs for South Carolina Motor Dealers Outing Is Announced

CHARLESTON, S. C., May 10—The tentative program for the semi-annual meeting of the South Carolina Automotive Trades' association at the Isle of Palms, near Charleston, June 24-25, has been made public by A. Mason Gibbs, of Columbia, president. The program calls for a busy two days for the automotive trade people of the State who go to the meeting.

The convention opens on the morning of June 24, at 10 o'clock with an automobile parade of all the dealers. The dealers will afterward board a special ferry boat to the Isle of Palms, where lunch will be served. In the afternoon the first business session will be held.

On June 25, the ferry boat leaves Charleston at 10 o'clock and the dealers will arrive at the Isle of Palms at 11 o'clock. The meeting will begin immediately thereafter. At 1:30 o'clock the banquet will be served in the pavilion. Following the banquet there will be a dance. All members of the association will be urged to bring their wives and other members of their families to the meeting.

Among the speakers at the meeting will be H. B. Harper, president of the National Automobile Dealers' association; John O. Munn, of John O. Munn Co., Toledo, Ohio; and Ray W. Sherman, executive editor of the Class Journal Co., New York. The meeting promises to be one of the largest gatherings of automobile and accessory dealers ever held in South Carolina. More than 500 are expected. The South Carolina association has a membership of about 250, with a growing list.

DEVISES VEHICLE TO FIGHT SNOW

Buffalo, May 11—Heavy snow drifts, which have kept practically every western New York road closed to automobile traffic for weeks, may result in a new type of winter vehicle being devised.

Melvin G. Morse of Bath, N. Y., has applied for a patent on a new sleigh runner device which he claims will enable passenger cars and trucks equipped with it instead of front wheels to cut through or surmount even the extensive drifts of last winter. A company is being formed to manufacture and market the runners, Frank Wretlof, formerly associated with the Chevrolet interests, being a partner of Mr. Morse.

RUNS ENGINE TO GET CAR

Charles City, Iowa, May 10—There is a garage owner at the town of Rockford in this county who doesn't allow a strike to interefere with his getting a car he is much in need of. C. M. Aurand, learned there was a Cadillac car aboard a train for him which was being held up by the switchmen's strike at Niles, Michigan. Mr. Aurand went there and after waiting two days went to the railway superintendent about the matter. The latter told him if he could run a switch engine he could go ahead and get his car out of the train. Mr. Aurand wasn't going to let a little thing like a strike hold up his car and he had confidence in himself to run a real live locomotive engine so he went ahead with the big engine and landed his Cadillac car. He told the superintendent he would run anything from a battleship to a lawn mower in order to get his Sedan and he made good with the switch engine.

FIRE ENGINE FRIGHTENS THIEVES

Milford, Mass., May 7—Another new use for motor fire trucks was demonstrated early yesterday morning by the clanging of a bell on the machine which frightened away four yeggs who were attempting to blow open the safe in the postoffice.

A neighbor, whose house is in the rear of the postoffice, saw the men force a window. He immediately telephoned the police and fire departments and William Ahern, who was on duty in the engine house at night, started in a motor engine to warn the town. As he sped through the streets he kept the gong constantly ringing, with the result that the burglars left in such a hurry that they left a quantity of nitro-glycerine, drills and other tools behind them. They escaped in, a stolen Buick car, which was later abandoned and found in a yard in South Boston.

TRAFFIC RULE HITS DEALERS

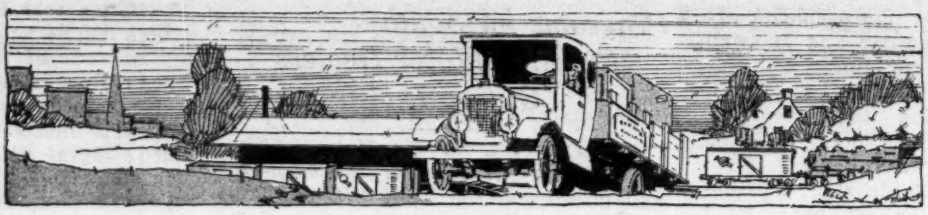
Los Angeles, May 10—Streets in the congested district of the city to-day resembled a deserted village insofar as automobile traffic is concerned. The most drastic traffic ordinance ever enacted is now in effect and 1500 motorists were arrested the first day. Between certain hours the time limit on stops in the congested district is two minutes. At twelve of the principal street intersections no left-hand turns are permitted. Adjacent to the congested district is a business district in which parking is permitted for two hours. Many of the automobile dealers have their establishments within the business zone and they declare the two-hour limit is a handicap on trade. Streets that formerly were lined with used cars awaiting sale are now entirely free. This has placed a premium on vacant lots whereon to put these cars.

LICENSE BOSTON CAR DEALERS

Boston, May 7—Beginning May 1, license fees affecting the motor trade in the city of Boston will be collected in order to do business. The order was issued by Police Commissioner Curtis last night and is as follows:

Dealers in used automobiles will pay $50 for a license, sightseeing automobiles will be charged $10, for twelve-passenger cars $15, for eighteen-passenger cars $25, for twenty-four-passenger cars and over twenty-four-passenger cars $50. Chauffeur's license, $1.

These licenses are in addition to the state registration fees they all have to pay.



"Ship-By-Truck" Is Week's Slogan

Scores of Parades, Tours and Demonstrations Are Scheduled for Annual Observance of Event

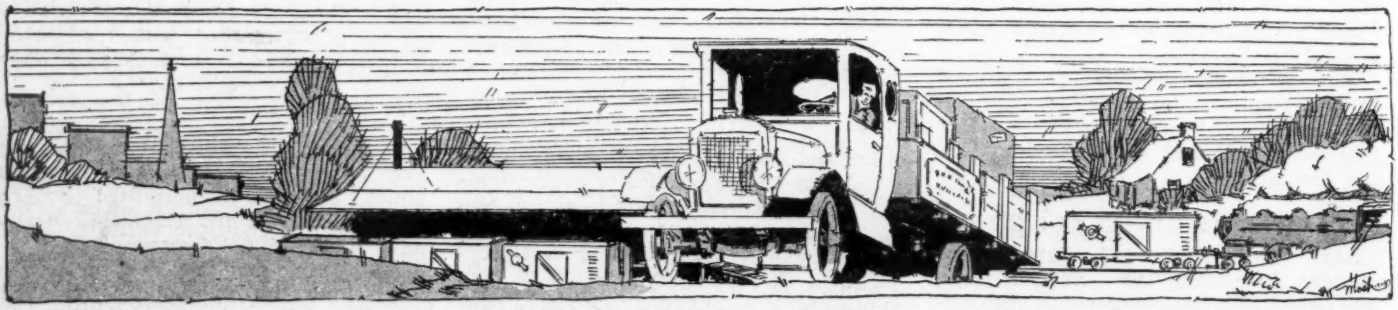
"SHIP-BY-TRUCK Weeks" holds the boards in most parts of the United States next week with truck manufacturers, truck dealers, tire manufacturers and dealers, transportation industries and just plain people showing more interest in the event than ever in the past. From a publicity "stunt" by the Firestone Tire & Rubber Co., the movement has grown and grown until now it has transcended in importance any individual concern, and while the Firestone is still, and rightfully, cashing in on its innovation, Ship-By-Truck Week is really a national institution.

Propaganda on the value of overland transportation by motor truck is antiquated. It is truly a benighted individual or locality which isn't sold on the value of the highway transport service. Even Congress is beginning to see the light and Congress is usually the last organization in the United States to adopt a new idea. We don't have to argue for highway transportation any more; we just take it calmly for granted and use it as a basis for other arguments.

Being Given Official Recognition

Throughout the United States, the importance of the movement is being given official recognition. Governors of a score or more of the States have officially designated May 17 to 22 as Ship-By-Truck week, while the mayors of cities and towns almost without number have taken similar local action. In most cases these official recognitions carry with them certain active official participation, ranging all the way from the lending of official trucks for parade work to mere addresses by officials on the advantages of the ship-by-truck movement.

Dealers' organizations in many parts of the country are making special efforts for this week. The wide publicity attendant upon Ship-By-Truck Week throughout the United States makes truck tours staged during this week particularly beneficial to the dealers. There will be hundreds of truck demonstration tours, while the local parades and celebrations will be almost innumerable. Nearly every dealers' association in the United States has arranged for some sort of recognition of the week, and these plans range from the most modest to the most ambitious.



Standard Mechanical Operations in Tractor Service

Due to an unavoidable delay in the mail, the fifteenth article of this series now running in MOTOR AGE will not appear until next week.

For the benefit of new readers, we might state that this series of articles deals with operations which have been standardized in the service work connected with present-day tractors. So far the subject of ignition and carburetion have been taken up. When the series is finished the entire tractor will have been covered.

This series is valuable to the automotive dealer because, First: It will instruct him in the more common operations he will be called upon to perform in the servicing of all kinds of automotive equipment: Second: It will enable him more intelligently to instruct his customers and to convince them of the relative simplicity of the things they should know and will have to do in order to look after their tractors.

The series is valuable not only to those engaged in handling tractors, but motor cars and trucks. What applies to the ignition, carburetion, etc., to a tractor applies equally well to trucks and motor cars. A gas engine is a gas engine, whether in a tractor or passenger car and with certain modifications what applies to one applies to the other.

Using the Crane puller on an electric motor

Removing a flywheel with the aid of the Crane puller

The old method of hammer and chisel used in removing a gear

Various Uses of the Crane Puller in Repair Shops

TIME has become such a great factor in repair shops and service stations that the mechanic naturally turns to those devices which will give him the greatest assistance and help him cut down the aggregate time necessary to a job on schedule time. Among the new devices which have been brought to the attention of the service and maintenance man, is the Crane puller, manufactured by the Crane Puller Co., of Arlington, Mass. This tool seems to have unlimited adaptability, and is so designed that it is instantly useful regardless of the size of the gear, transmission, pulley, wheel, cam or commutator that it is required to remove.

In the old days it was customary for the mechanic to use a hammer and a drift to remove whatever part wanted, but this method was always dangerous and it very often resulted in trouble that was difficult to explain and more difficult to charge for. The car owner it seems is entirely within his rights, when he requires that the mechanic will use tools that will not injure his machine, or break a part.

Oftentimes the service man meets a wheel or a pulley that has been rusted in and defies the ordinary methods for its removal. In such cases a puller is the natural machine to apply and the Crane puller is one that is peculiarly adaptable. In one of the illustrations shown the Crane puller is applied to a spider. The spider is in an inacessible place and the ease with which the spider is being removed is apparent. An adjustment feature makes it possible to apply the machine to any size pulley or collar. The arms are also adjustable, and these are furnished with the machine. Other attachments, such as pipe benders, arbor press fittings, etc.

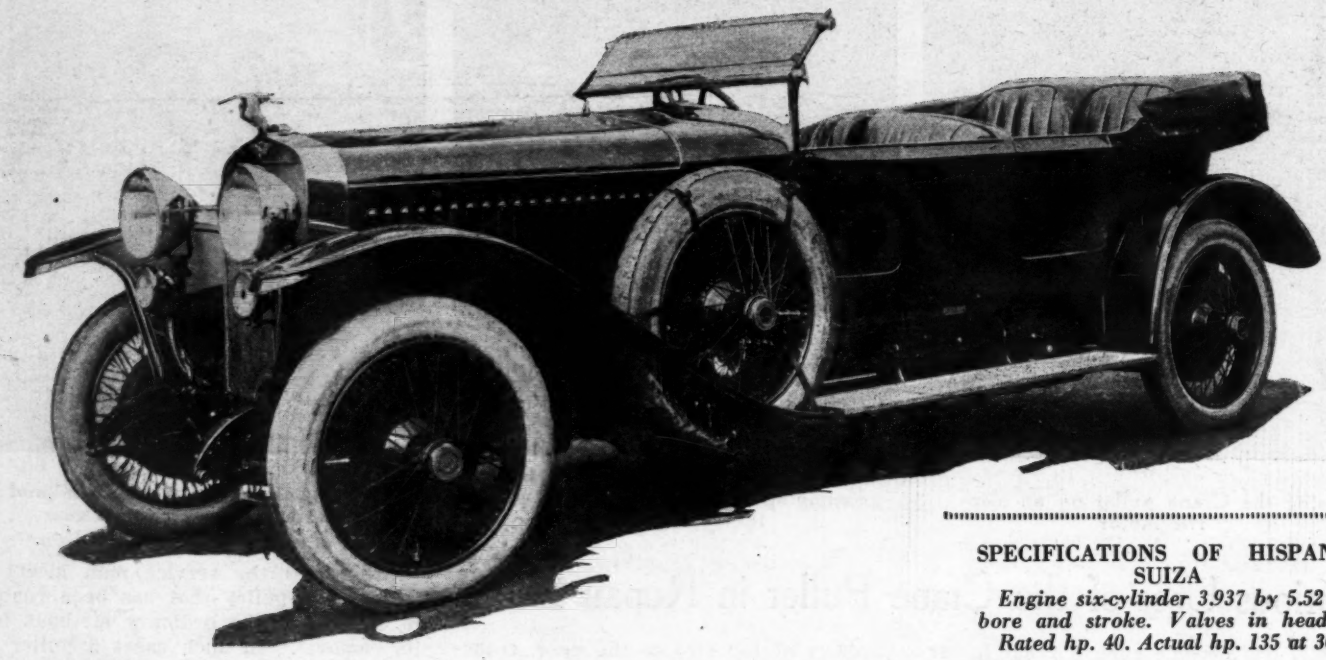
Using the puller to remove the same gear

Removing a very inaccessible spider with the aid of the Crane puller

Removing a broken flywheel, a very difficult task at best

Hispano-Suiza Six in Production

Engine Based Entirely on Aviation Experience and Develops 135 Hp. at 3000 R. P. M. Brakes on all Four Wheels

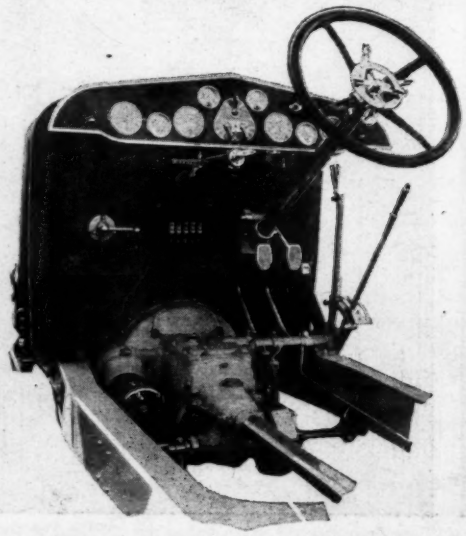


HISPANO-SUIZA is just getting into production on the new six-cylinder car which proved to be one of the greatest attractions of the Paris and London automobile shows. A first experimental set of ten cars has been built, and these having proved satisfactory the main series is being put through. Regular deliveries will be made from the middle of the summer.

This car, which is the product of Mark Birkigt, the designer of the eight-cylinder aviation engine produced in greater quantities than any other allied engine, is based entirely on aviation and war experience, and is an attempt to reach the top notch of excellence.

Complete chassis weight, including water, wheels and tires, oil, lighting and ignition equipment and two batteries, is 2525 lbs., which is exceptionally light for a car with a 145-in. wheelbase and standard tread. The engine alone weighs 540 lbs. The crankshaft before machining weighs 770 lbs., and in its finished condition 99 lbs. The maximum speed of the car with full touring equipment has not been accurately determined, but is in excess of 80 m.p.h. On a six-mile stretch it has averaged 78 m.p.h., and on a 300-mile journey, from Paris to Lyons, it has averaged 50 miles. Acceleration tests showed that from dead slow—6 m.p.h. on top gear—the car was running at 50 m.p.h. in 21 seconds, and had reached 62 m.p.h. in 30½ seconds. This acceleration was obtained with a final gear ratio of 3.4 to 1, full-sized wheels, and no special carbureter setting.

There are brakes on all four wheels, their diameter being 15.7 in., with shoes of 2.3 in. in width. The brakes are applied by means of a servo-brake which makes use of the momentum of the car to arrest its progress. Running at 68 m.p.h. the car could be pulled up in 75 yards, this being on a good macadam road with a very slight down grade. On the same road tests were made for stopping against time. From 72 m.p.h. the car was brought to a standstill in 5 seconds on one occasion, and in 7 seconds on the second attempt. The road was dry, but the adjustment of the servo-brake was not quite sufficient to lock the wheels. These brakes are laid out according to Perrot designs, with several detail features devised by the Hispano-Suiza engineers. Instead of spherical connections from the frame to the brake arm the Hispano-Suiza makes use of yokes.



The instrument board of the Hispano-Suiza

SPECIFICATIONS OF HISPANO-SUIZA

Engine six-cylinder 3.937 by 5.52 in. bore and stroke. Valves in head.
Rated hp. 40. Actual hp. 135 at 3000 r.p.m.
Delco ignition with Delco generator.
Disk clutch with three-speed transmission.
Semi-elliptic springs.
Front and rear wheel brakes.
Car speed—over 80 m.p.h.
Chassis weight—2525 lbs.

This is the first car with an engine based entirely on aviation practice to be put into production in France. Its six cylinders measure 100 by 140 mm. (3.937 by 5.52 in.) bore and stroke and are steel forgings threaded externally and screwed into an aluminum block. This gives a neat block construction, but any cylinder can be replaced independently of the others if by reason of scoring this should become necessary. There are two detachable water jacket plates, one on each side of the engine, and the holding-down bolts, with the exception of the end ones, are inside this. There is not iron contact with the cooling water, and in consequence no rust can be formed.

The two valves per cylinder are mounted vertically in the head and are operated direct from an overhead camshaft without any intermediate mechanism between the cam and the valve stem. The camshaft is carried in seven plain bearings and there is an equal number of bearings for the hollow circular web balanced crankshaft. This engine develops 100 hp. at 1600 revolutions, 115 hp. at 2000 revs., and 135 hp. at 3000 revolutions, with a compression of 64 lbs.

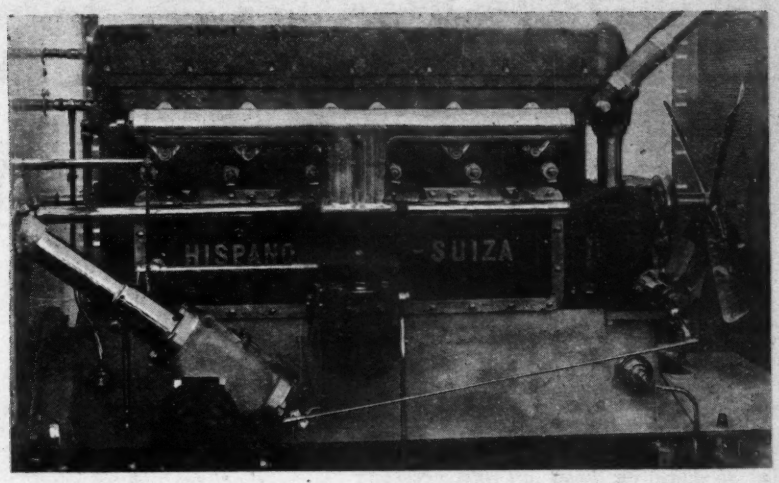
Birkigt, the designer of this car, is the first French engineer of a really high-

grade car to abandon the magneto. He has replaced it with the Delco somewhat modified to suit his own ideas, and with two special distributers, each one delivering current to a set of six plugs set at opposite sides of the cylinder. The electric generator is mounted on the front extension of the crankshaft in a recess formed in the base of the radiator. The starting motor is mounted alongside the three-speed gearbox and is geared up in relation to the engine. As a precaution against the batteries being run down, there are two sets, a large one with a capacity sufficient for all purposes and a small one only used for ignition and for the side lamps. The two are charged from the one generator, but it is impossible to bring the small battery into service for starting or for the headlights. Starting from cold is facilitated by a gasoline injector mounted on the dash. This injects petrol vapor into the aluminum manifold, the interior of which is baked enameled with a glass-like surface.

The Hispano-Suiza engine is attached to the frame at four points and tends to stiffen it. The crankcase webs overlap the top of the side frame members, and the space at the front is filled in by polished sheet aluminum. The dashboard makes an airtight connection with the engine basechamber, so that all air entering through the radiator must escape laterally through the louvres in the side of the hood.

One of the features of the brake construction is the use of die cast aluminum ribbed brake drums, fitted with a steel liner. These are made of steel strips formed into a circle, welded, drilled and ground internally. The aluminum is cast around these and perfect adherence is obtained between the two by reason the holes drilled in the steel liner. This design makes it possible to secure a very hard wearing surface, while reducing weight and cutting cost of production. The four drums are interchangeable.

Further reduction of the unsprung weight has been obtained by the use of hollow differential and propeller shafts.



The intake side of the Hispano-Suiza engine

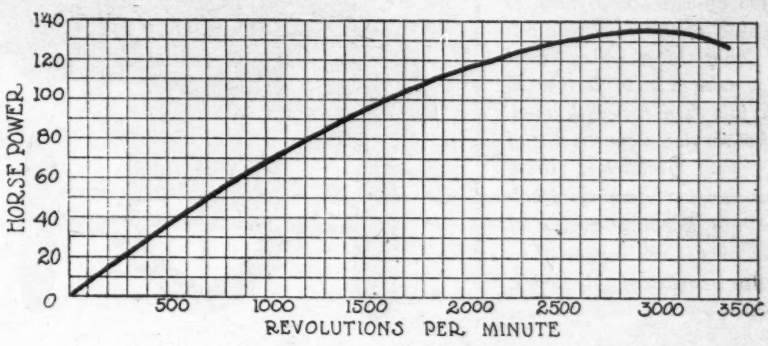
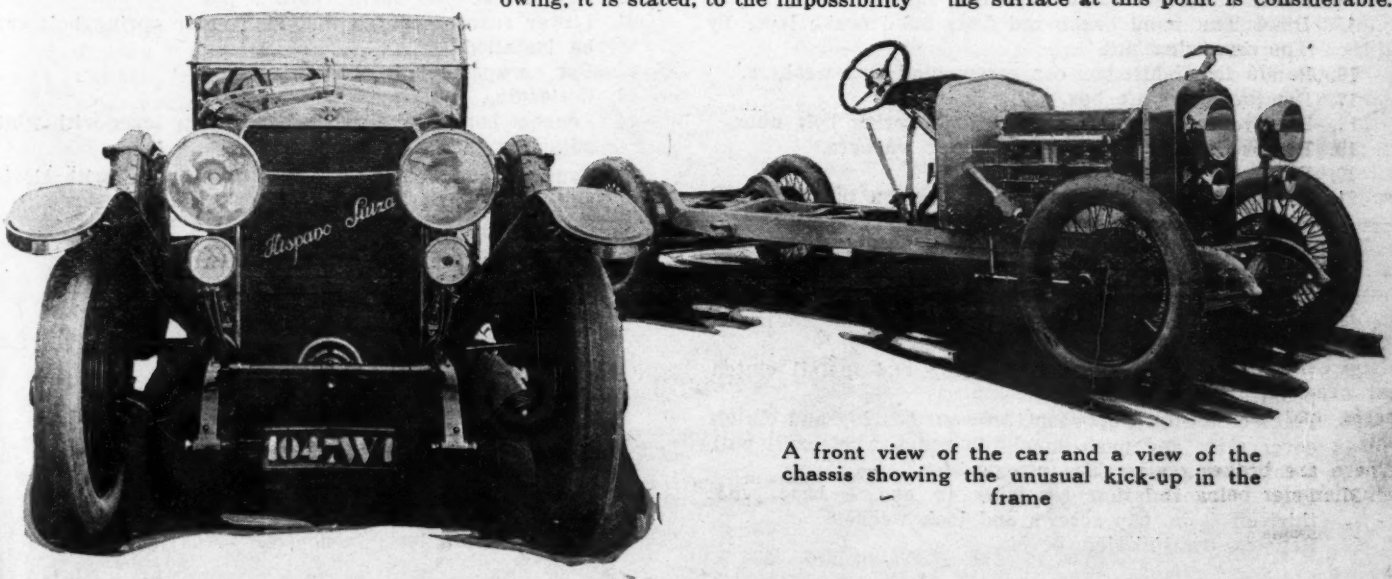


Chart showing horsepower developed by the Hispano-Suiza engine at the various revolutions per minute

The drive shaft is in two parts, the forward half being exposed and the rear half contained in a housing with a spherical connection to a heavy cross frame member. The sphere is carried in ball bearings on the cross frame member. By reason of the engine being used to stiffen the frame members, only three cross members are required. These are a tubular member ahead of the radiator, the heavy central member taking the drive, and a rear cross member. Gleason gears are used in the rear axle.

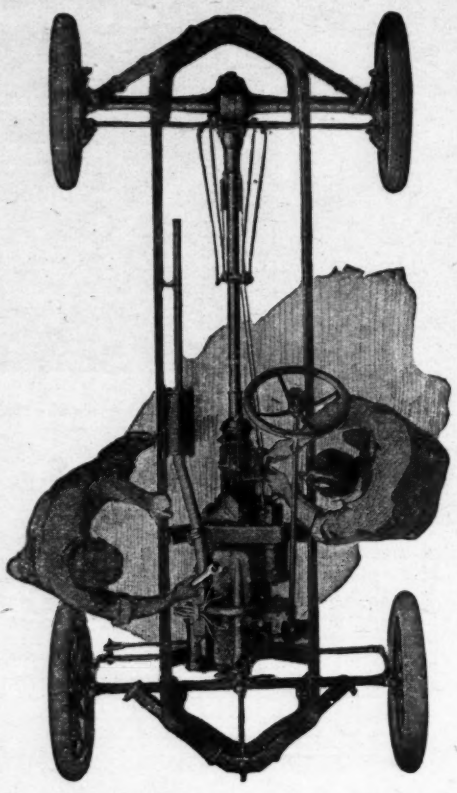
Hispano-Suiza has not followed the general fashion of cantilever springs, owing, it is stated, to the impossibility of getting good road stability with these springs when running at high speed. Instead, semi-elliptics with a large number of thin leaves, are made use of. The two axles are considerably offset on the spring, there being a short length ahead of the front axle and a long length of spring ahead of the rear axle. With central drive the use of the Hotchkiss drive has naturally had to be abandoned. The springs oscillate on the axle, and the spring seat is a single piece forging backed with bronze and lined with white metal. Oil grooves are cut in this and a wick lubricator is provided. The bearing surface at this point is considerable.



A front view of the car and a view of the chassis showing the unusual kick-up in the frame

SERVICING THE OVERLAND FOUR

THIS is the thirteenth of a series of articles dealing with the service operations on the Overland Four. The work as it stands has been prepared by the Willys-Overland Co. and the dealer will find at the head of each operation the amount of time required to do the job. The operations have been put down in a step-by-step method so that one operation is logically followed by the next. This makes it possible for the service man to have on hand all the necessary tools and equipment before beginning the job. Incidentally, the time limit set for the job affords a ready means whereby the skill of the mechanic can be judged. Other things being equal it should not take a man longer to do a certain job than herewith mentioned, as the service department of the factory has established these limits after much experimenting. Dealers who are not keeping copies of MOTOR AGE on file are suggested to do so to get the benefits of this series.



PART XIII—The Engine

THESE valuable articles—Servicing the Overland Four—will run serially each week until the service operations on the entire car have been explained. This week deals with the

Engine

Next week will be given the service operations on the rear system.

Keep a file of MOTOR AGE for ready reference. The flat-rate system of estimating on a job has been proved the best plan to make your service work more profitable, eliminate complaints and please your customers. The time given here for each service operation can be adapted to the flat-rate system of estimating cost of repair jobs on cars of this class.

TO REMOVE AND REPLACE TRANSMISSION UNIT

Time: 2 hrs.

1. Take weight of car off rear spring with chain falls or crane.
2. Drain oil from engine.
3. Drain oil from transmission case.
4. Remove clutch and brake pedal pads by removing clamp bolts, lock washers and nuts.
5. Unhook accelerator spring.
6. Unscrew accelerator button.
7. Remove four cap screws holding floor boards to body.
8. Disconnect speedometer cable at speedometer head.
9. Remove floor boards.
10. Remove clamp bolt from clutch pedal.
11. Remove clutch pedal from shaft.
12. Remove Woodruff key from clutch pedal shaft.
13. Disconnect brake rod from brake pedal by removing cotter and clevis pins.
14. Remove brake pedal from clutch shaft.
15. Disconnect hand brake rod from hand brake lever by removing wing nut.
16. Remove gearshift box cap screws and lock washers.
17. Remove gearshift box.
18. Remove cotterpins from rear axle spring bolt nuts.
19. Remove spring bolt nuts and lock washers.
20. Drive out spring bolts.
21. With proper blocking, block up torsion tube and roll out rear system.
22. Remove thirteen ⅜-in. cap screws with lock washers holding transmission assembly to engine.
23. Remove transmission assembly.
24. Place transmission assembly in position as far as it will go.
25. Put in clutch shaft Woodruff key and install clutch pedal.
26. Place clutch fork between throwout bearing and clutch cover plate and push on clutch pedal. This will pull transmission assembly into position.
27. Fasten transmission assembly to engine base with thirteen ⅜-in. cap screws and lock washers.
28. Replace transmission cover.
29. Put on four $\frac{5}{16}$-in. lock washers and nuts on gearshift box studs and tighten securely.
30. Remove clutch pedal and key from clutch shaft and replace foot brake pedal.
32. Insert Woodruff key in clutch shaft.
33. Place clutch pedal, clamping with ⅜-in. bolt, lock washer and nut.
34. Replace floor boards.
35. Connect speedometer cable to speedometer head.
36. Replace clutch brake pedal pads with $\frac{5}{16}$-in. clamp screws, lock washers and nuts.
37. Connect accelerator spring.
38. Screw on accelerator button.
39. Roll rear system under car—one man guiding propeller shaft into universal joint. It may be necessary to place transmission in low gear, hand-cranking the engine so that splined end of the propeller shaft will slip into universal joint housing.
40. Put in left rear spring bolt.
41. Lower rear of car so that right rear spring bolt can be installed.
42. Put on spring bolt nuts.
43. Cotterpin.
44. Connect hand brake rod in hand brake lever with wing adjusting nut.
45. Connect foot brake rod to foot brake pedal with clevis and cotterpin.
46. Remove chain falls or crane.
47. Put one gallon of oil in engine base.

TO REMOVE AND REPLACE GEARSHIFT HOUSING

Time: 15 min.

1. Remove floor boards.
2. Remove hand brake wing adjusting nut.
3. Remove brake rod from hand brake lever.
4. Remove four $\frac{5}{16}$-in. nuts and lock washers from gear shift housing studs.
5. Remove gearshift housing.
6. Place transmission sliding gear in neutral.
7. Place gearshift lever in neutral.

8. Place gearshift housing in position on transmission case.
9. Tighten with four $\frac{5}{16}$-in. lock washers and nuts.
10. Connect brake rod to hand brake lever with wing adjusting nut.
11. Put in floor boards.

TO REMOVE AND REPLACE GEAR SHIFTER FORK

Time: 30 min.

1. Remove floor boards.
2. Remove hand brake wing adjusting nut.
3. Remove four $\frac{5}{16}$-in. nuts and lock washers from gearshift housing studs.
4. Remove gearshift box.
5. Remove split pin from shifter fork shaft holding shaft to housing.
6. With drift, drive out shifter fork shaft far enough to remove shifting fork.
7. Assemble new shifter fork on shaft.
8. Drive shaft to position and pin.
9. Put on gearshift housing.
10. Put on lock washers and tighten securely with four $\frac{5}{16}$-in. nuts.
11. Connect brake rod to hand brake lever with wing adjusting nut.
12. Install floor boards.

TO REMOVE AND REPLACE GEAR SHIFT LEVER

Time: 15 min.

1. Unscrew ball from top of gearshift lever.
2. Pull out cotterpin from gearshift lever spring retainer.
3. Remove retainer and spring.
4. Remove gear housing cap.
5. Drive out pin with drift and remove gearshift lever.
6. Assemble gearshift lever in position.
7. Insert pin.
8. Put on gearshift housing shaft packing.
9. Put on gearshift housing cap.
10. Put on gearshift lever spring.
11. Put on gearshift lever spring retainer and cotterpin.
12. Screw on gearshift lever ball.

TO REMOVE AND REPLACE CLUTCH AND BRAKE PEDAL

Time: 30 min.

1. Unscrew accelerator button.
2. Unhook accelerator spring.
3. Remove clamp bolts holding pedal pads.
4. Remove pedal pads.
5. Remove floor boards.
6. Remove clamp bolt holding clutch pedal to operating shaft.
7. Remove clutch pedal and key from shaft.
8. Remove cotter and clevis pin from brake pedal and brake rod.
9. Remove brake pedal.
10. Put on brake pedal.
11. Connect brake rod to brake pedal with clevis and cotterpin.
12. Put key in operating shaft.
13. Put on clutch pedal and clamp with clamp bolt, lock washer and nut.
14. Put in floor boards.
15. Put in pedal pads clamping to pedals with clamp bolt lock washers and nuts.
16. Hook up accelerator spring.
17. Screw on accelerator button.

TO REMOVE AND REPLACE TRANSMISSION AND UNIVERSAL JOINT ASSEMBLY Time: 2 hrs.

1. With chain falls or crane, take weight of car off rear springs.
2. Remove cotterpin from brake rod and service brake pedal clevis pin.
3. Remove clevis pin.
4. Remove wing adjusting nut from hand brake lever brake rod.
5. Remove cotterpins from axle spring bolt nuts.
6. Remove two $\frac{5}{8}$-in. nuts from spring bolts.
7. Drive out bolts.
8. Disconnect speedometer cable from speedometer drive shaft.
9. With proper blocking under torsion tube, roll rear system out from under the car.
10. Drain oil from engine by removing plug under clutch housing.
11. Disconnect speedometer from speedometer head.
12. Remove $\frac{5}{16}$-in. cap screws, lock washers and nuts from clutch pedal pads.
13. Remove clutch and brake pedal pads.
14. Unhook accelerator spring.
15. Unscrew accelerator button.
16. Remove floor boards.
17. Remove clutch pedal by taking out $\frac{3}{8}$-in. lock bolt, lock washer and nut.
18. Remove Woodruff key from clutch fork shaft.
19. Disconnect foot brake rod from foot brake pedal by removing cotter and clevis pins.
20. Remove foot brake pedal.
21. Remove four $\frac{5}{16}$-in. nuts and lock washers from gearshift housing.
22. Disconnect hand brake rod from hand brake lever by removing hand brake wing nut.
23. Remove gearshift housing.
24. Block up under transmission case.
25. Take out all cap screws holding transmission assembly to engine.
26. Remove transmission assembly.
27. Place transmission assembly in position on blocks and insert clutch shaft in clutch. It may be necessary to hand crank the engine in order to get the clutch shaft started in the driving disk.
28. Place clutch shifting fork over clutch thrust bearing.
29. Put key on clutch fork shaft and install clutch pedal.
30. By pushing out on clutch pedal will draw the transmission assembly into place.
31. With sixteen $\frac{3}{8}$-in. cap screws, lock washers under head, bolt transmission assembly to engine case.
32. Place sliding gears in neutral.
33. Place gearshift lever in neutral.
34. Assemble gearshift box on transmission.
35. Put four lock washers and four nuts on gear shift box. Tighten securely.
36. Connect hand brake rod to hand brake lever with wing adjusting nut.
37. Remove clutch pedal and clutch operating shaft key.
38. Assemble brake pedal on clutch operating shaft.
39. Put key in clutch operating shaft.
40. Assemble the clutch pedal, clamping with clamp bolt lock washer and nut.
41. Connect foot brake rod with clevis pin and cotter.
42. Connect speedometer cable at speedometer drive shaft.
43. Put in floor boards.
44. Put on brake pedal pads with clamp bolts, lock washers and nuts.
45. Hook accelerator spring to accelerator rod.
46. Screw on accelerator button.
47. Roll rear system under car—one man steering propeller shaft into universal shaft. It may be necessary to place transmission in low gear and hand crank engine to line up universal joint with propeller shaft.
48. Put in left rear spring bolt.
49. Replace two $\frac{5}{8}$-in. bolt nuts.
50. Cotterpin.
51. Replace hand brake rod in hand brake lever connecting with wing adjusting nut.
52. Replace clevis pin, connecting brake rod to service brake pedal.
53. Cotterpin.
54. Remove chain falls or crane.

Garage Planning
Service Station Arrangements

No. 221

CONDUCTED BY TOM WILDER

CAR ASSEMBLY PLANT

As a subscriber of the Motor Age, I have read with much interest about the various plans and layouts that you have made for garages, salesrooms and service stations, and will say that these nearly always looked good to me.

However, I do not recall ever having seen a plan for an up-to-date assembly plant that would be suitable for the assembly of a limited number of four and six cylinder passenger cars such as we are now producing.

The ground space available is large enough to build a building, 100 ft. front and 300 ft. deep as the enclosed sketch shows, and we will place a foundation to carry four floors, one or two to be built now and the balance later on.

Would have showrooms and offices on Pearl road, and arrange balance to suit requirements.

Estimated production for 1920—thirty-five four-cylinder and one hundred fifteen six-cylinder cars. — Gus. A. Baumetz, Cleveland, Ohio.

We have had to assume a great deal in arranging this plant, not knowing the type of car or the condition in which you get your parts.

To do the amount of assembling you intend doing would require no special plant. A few trained men in a small shop with a reasonably sized part store room ought to be able to put together a car in two days without any trouble at all, this being the average time at 150 cars per year.

You probably have visions of increasing this to a thousand or two a year, however, and we have laid out this plan with this possibility in view.

Stock all enters at the receiving room where it is checked carefully and then distributed to special stock rooms along the assembly route. At "A" a frame is placed upon a cradle or car running on large castor wheels and built for the purpose of carrying the chassis until it receives its own wheels at "B," from which point it is returned to "A."

Power plants are assembled at the side of the main line on wheeled benches or cradles built for the purpose. These assemblies reach the point "C" when complete and they are transferred from the cradle to the waiting chassis by means of a chain hoist.

As soon as all connections are completed the chassis is run into the chassis painting room which is provided with spraying equipment if it is necessary to do a large amount of work in a short time.

Bodies are received directly into the paint shop, going from there through the finish and trim shops and meeting the completed chassis at "D," after which the chassis receive their final assembly of tops, lamps and other trimmings before going to the warehouse to await shipment.

It will be seen that the chassis assembly plant would be almost unlimited, providing stock was furnished and men were on hand to put it together, while on the other hand, two men could follow a car through and do all the work on it, delivering the one in two days that you now require.

It will also be seen that in case you do your own body paint and trim work as is usually the case when bodies are shipped from a distant factory, your shop facilities will be limited and as your demands increase your facilities in this department will have to be enlarged. Painting cannot be rushed through like assembling. It has to be done under right conditions, dried a certain length of time, rubbed down and done over. Consequently, if the total period of painting a body is a week, space will be needed to store a week's output of bodies stood on end with additional working space.

The partitions in this plant are wire rather than solid except in the paint rooms where they should be air tight to

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and readers are urged in asking for such plans to be used to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

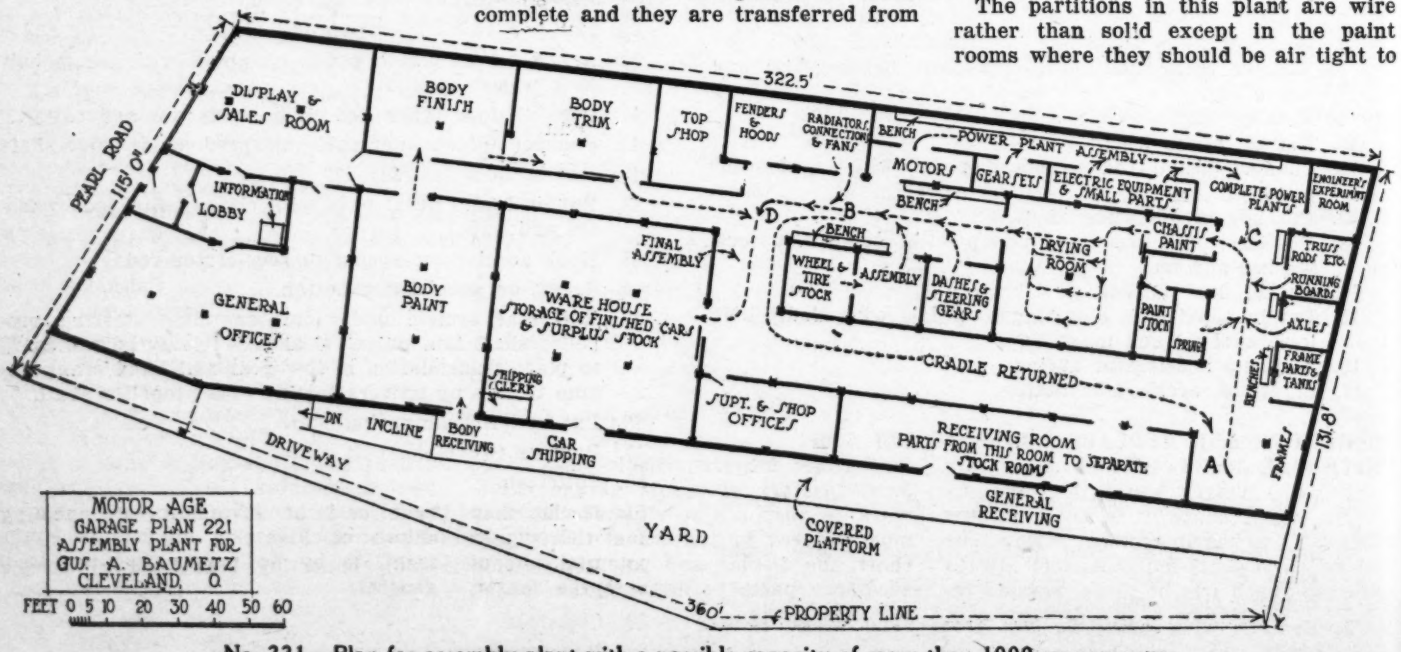
What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

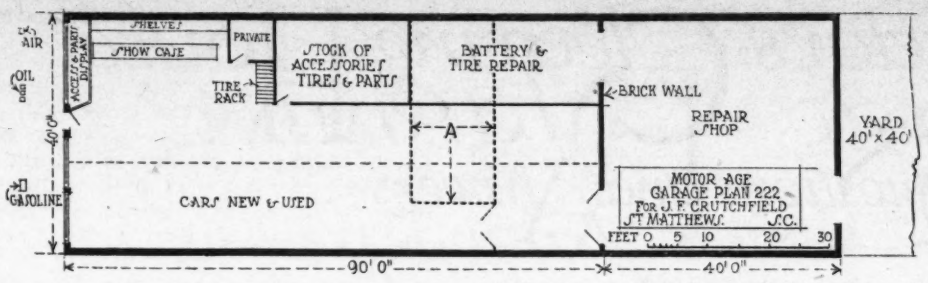
Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.



No. 221—Plan for assembly plant with a possible capacity of more than 1000 cars per year



No. 222—Present building remodeled and departmentized

keep out the dust. Light should be plentiful and skylights should be used. A second story over the front part of the building would give plenty of body finishing space, the finished bodies being dropped through a hole in the floor at the point "D." The space we show could be used for storage and shipping.

No. 222

PRESENT PLACE REMODELED AND DEPARMENTIZED

We are enclosing a penciled sketch showing our present arrangement. Our building is one story, cement floor, street level. We can arrange a front entrance anywhere except where the center post is located. We would not hesitate to move our gasoline pump, oil pumps, office or to make any other change to get convenience and to make our accessories and parts safe. At present our accessories, repair parts and tires are exposed and we lose a certain amount on account of these being open and no one responsible for them.

We want to have one man run the battery and tire repairs. We want a space for this purpose that can be locked up. We want a room for repair parts accessible to both front and back, but entirely separate and locked up. We want a small private office where our books can be kept and letters written. We also want a place near the front for the cash register and where price list and catalogues can be kept.

We think we can keep one man busy with tires and batteries and another to take care of accessories, gas and oil. The parts will have to be handled by either the accessory man or the battery man.—Fairey-Bates Motor Co., St. Matthews, S. C.

We believe you are making a mistake to invest much trying to build this narrow building into a first class place.

We have tried every conceivable way to arrange it with a front entrance but it seems impossible unless you leave it as you have it, that is, all open. There is no real reason for a front entrance, however, if you carry out your changed policy of giving up storage and specializing on service and sales. Many experts believe sales and service should be divided always and it would be doubly advisable in your case since to lay off a passage way for cars through a front entrance would necessitate sacrificing at least a quarter of your space and at the same time make the remaining space so narrow as to be of little use.

With this arrangement no change would be required in your gas oil and air facilities.

It would be best to turn over the complete stock of parts, accessories and tires to one person and if it proved too much for him give him an assistant to keep the stock and help in sales after he has experience enough.

There is plenty of room for car display in this plan, the space accommodating as many as fourteen cars. Quite a used car exhibit could be held at the rear.

If more shop space is desired and a smaller car sales room, turn the battery and tire room around as set at "A," leaving a narrow passage to get cars in and out. In this scheme the space in front of the brick wall could be reserved for the machine equipment as it would be too limited in size for general use and the brick wall would be a protection to the equipment.

What Good Roads Have Done for California

(*Concluded from page 9*)

stocks are in charge of a special repair or accessory salesman, and the business is obviously so large that it must be an important and profitable part of the business of nearly every automotive dealer regardless of how many there may be.

In this same connection, too, the visitor out here will notice the very large number of gas filling stations which also sell accessories. Some of these as well maintain small but capable repair and service stations. Naturally these institutions are designed to take care of emergency work, and as some of them stay open much longer hours than the ordinary repair shops, it is not a serious matter if one has an accident at any hour during the twenty-four. Almost always one can reach one of these wayside repair shops and get fixed up. This is something one rarely sees in the East, and the visitor to California must be impressed with it as an eminently sensible idea, but also he will begin to realize what a tremendous demand there is for all sorts of automotive service out here.

Mere mention may be made of the care and forethought given to the display of parts and accessories. All sorts of display expedients are resorted to, of course, to bring and to keep such things under the eye of the motorist. Many of the stockrooms and display cases are located either alongside garage driveways, or they are so situated that they must be seen by the casual tourist. In short, the display and potential sale of accessory parts pertains to the tourist element and are designed to meet the emergency demand rather than to be a preparation for a regular and local demand. A direct and potent bid for the former is made.

While communities differ out here, and while garage and service stations of all sizes and degrees of efficiency exist, it may be said that any town within a radius of many miles of Los Angeles can be pointed to as typical of what is almost universal. Take Riverside, as an example.

Riverside, as towns go, is not so very much of a place. True, it lies in the midst of orange groves and is distinguished as one of the principal shipping points for citrus fruit in the orange belt. Its location, geographically speaking, is naturally attractive and buried as it is in palms, flowers and trees, it has that beauty which is typical of most of the towns in this part of Southern California. In striking points of interest it does not abound unless one excepts Mt. Rubidoux, on the summit of which open air Easter services are performed before thousands of devotees who ride and hike to its summit before sunrise on Easter morning. On the remaining 364 days of the year Mt. Rubidoux has importance merely as a wonderful automobile ride and for the remarkable and varied view one gets from its summit. The remaining attraction at Riverside is the Glenwood Mission Inn.

Riverside a Typical Case

This is a shrine of the antique and the artistic than which there is none other similar in all this land. Every man and woman who comes to California feels he or she must visit it, wander through its crypts and corridors, listen to its organ and its chimes, or even get married in the chapel, and generally make obeisance to the archaic, the artistic and the beautiful. Thousands of visitors, in only a few less thousands of motor cars, visit Riverside every year.

Thus the provision for this flood of automotive equipment which flows in and out of Riverside must be ample. They are generously so. Such garages and service stations as those maintained by automotive concerns like Thomas Crossley, Hudson and Mitchell dealer; Button Bros., Chevrolet and Scripps-Booth; Parsons Garage; Glenwood Mission Garage, Studebaker; Keystone Garage, Overland; Central Garage; Glen A. Calkins, Ford dealer; J. W. Kemp, Cadillac; Brainard Motor Co., Buick, and Stutt Bros., Dodge, to mention only a few of the principal ones, are typical of what may be found in almost any Southern California community lying in the tourist zone.

In this connection a few pictures are shown herewith which depict the attractions of some of these places, but which are no whit better nor more attractive than are hundreds of other similar institutions to be found all through this section of Southern California. What has been said of Riverside, and what is shown of Riverside automotive equipment, is by no means peculiar—it is general.

The Readers' Clearing House

Questions and Answers

CONDUCTED BY ROY E. BERG
Technical Editor, Motor Age

THIS Department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by some one else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

STEPHENS OILING SYSTEM

Q—A 1918 Stephens oil pump refuses to work and does not seem to have any pressure at all. The pump was taken out and the pipes thoroughly examined, but they are in good condition. The main bearings were taken up several times and the pump would work for a day or so after this was done and registered a pressure of about 10 lb. The pressure would gradually decrease in a short time. The adjustment was opened and connected up direct, but it didn't help. No air leak can be located. The bearings were burnt out and replaced with new ones, in fact, every possible thing that has been done in repairing oil pumps was tried. Would a new cam shaft affect the pump? Can you suggest what the trouble might be?

2—Could you advise where a book on oil pumps could be obtained?—Mickle Guthrie, Spiro, Okla.

1—The lubricating system on the Stephens is of the full pressure type. Figs. 1 and 2 show two views of the oiling system on this car. You will note in the detailed sketch that the oil flow is from the pump through a direct passage to the crankshaft, where it is distributed from an annular groove up the passage which leads to the cam shaft. In arriving at the cam shaft the oil passes a section at the shaft where there is a possibility of losing some of it, if it has ever happened, that the oil has become full of dust and dirt. The oil pump shaft is surrounded with bronze bushings and if these have become worn due to any negligence of the care of the oil then we advise you to look at this place for any possible trouble. It might happen that the gears of the pump have been replaced wrong. This has happened in several instances that we know of personally. The gears generally have one way to go on the shaft, but they can be placed on the wrong way too. This results in a flow of oil by the gears in the pump. If the bearings of the shaft are not fitting as tight as they should, the oil pressure will fall. So look to the bearings as you say you have already given them some attention.

2—We know of no book devoted exclusively to the subject of oil pumps. Many of the books on engine repair devote a chapter or so to the lubrication system, and we believe that any book such as Dyke, or Page, will give you all the information you need.

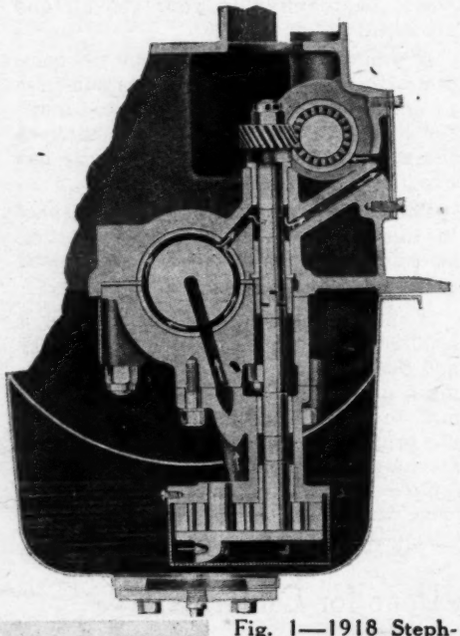


Fig. 1—1918 Stephens lubrication system showing flow of oil from pump through a direct passage to the crankshaft

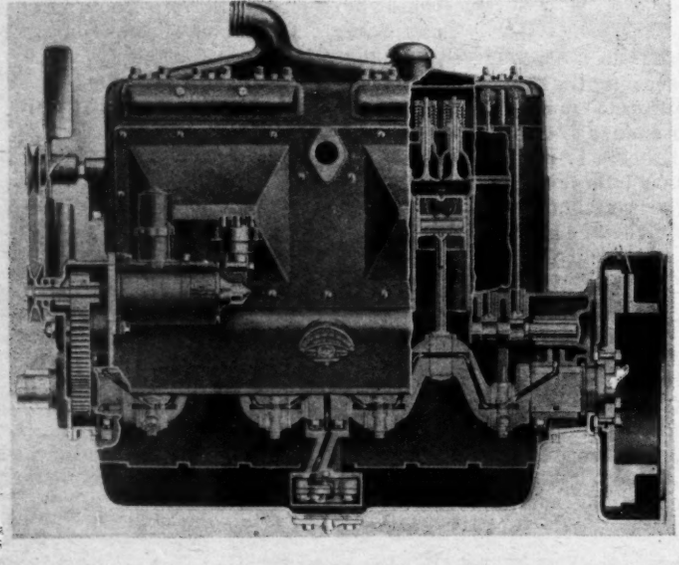


Fig. 2—Longitudinal section of Stephen engine showing flow of oil in the crankshaft

KNIGHT ENGINE LUBRICATION

Q—How long would it be necessary to run the engine in a 1920 Willys-Knight before the oil vapor from extra heavy Veedol oil would rise and start to lubricate the sleeve pins?—Edgar Durnan, Jr., San Francisco, Calif.

You have evidently conceived the wrong idea of how the sleeve valve engine receives its lubrication. It does not rise in form of vapor such as an early morning fog, but is thrown in a fine spray. The lubrication is drawn from the oil base, through a fine mesh screen, and forced direct to the three main bearings. From the main bearings it is forced through holes in the crank shaft, to the connecting rod bearings. The oil is also led to the bearings of the eccentric shaft, and from the front main bearing to the chains and sprockets which take the place of timing gears in the ordinary engine.

The oil works out around the bearings and the speed with which the parts are moving throws the oil in a fine spray to the sliding sleeves, wrist pin bearings and sleeve connecting rod bearings. The oil then drips back to the reservoir through a perforated screen.

The flow of oil is regulated automatically with the gasoline by a valve just in front of the oil pump, and which is connected to the throttle lever. Opening the throttle opens the oil valve so that as the engine speed increases a greater amount of oil is fed to the bearings.

OAKLAND LUBRICATION SYSTEM

Q—Publish diagram of the oiling system of a 1912 Model 40 Oakland.

2—Explain method of adjusting oil pump, the oil being poured into reservoir on left hand side in front of crank case. —Chas. B. Shenk, Lewistown, Pa.

1—We do not have a diagram of the oiling system of a 1912 model 40 Oakland, but the lubrication of the engine is by the splash system. The lubricant is supplied from an aluminum reservoir, which is integral with the crank case and located on the left side. An oil pump driven from the camshaft by worm and worm-wheel delivers the oil through a sight feed on the dash to the center crankshaft bearing. The amount of oil is regulated by a set screw which projects through the oil case cover. By screwing down on this the stroke of the

pump is shortened, and thus the flow of oil is slackened. The crankcase is of the barrel type. In the bottom is located an oil base, which is divided into pits or compartments by special shaped walls. As the engine is mounted on an incline to insure a straight line drive, provision is made to have a constant oil level under each connecting rod at all times and under all road conditions.

Oil grooves are cast in the walls of the crankcase so that as the oil is splashed against the walls it enters these grooves and is carried back to the main oil case. This system of grooves is perfect, and the distribution of oil in the several pits provides a uniform supply to each cylinder and bearing in proportion to its needs. Cocks are provided under each compartment for ascertaining the amount of oil and to facilitate the cleaning of the crankcase.

PAIGE CHASSIS

Q—Illustrate the chassis of a Paige 6-55.—K. Moosa Garage, Eunice, La.

This is shown in Fig. 3.

CHEVROLET OILING CHART

Q—Publish the oiling chart for a 1920 Chevrolet roadster, model F. B.—J. G. Jackson, Memphis, Tenn.

Oiling chart for this model is shown in Fig. 4.

BEARING CLEARANCE

Q—How tight should an old and new babbitt bearing be made with perfect lubrication?—Ray Lodingham, Kimball, Nebr.

This depends to a great extent where the bearing is located. In adjusting the main bearings in an engine after the bearings have been scraped and the cap has been drawn up tight the crank should turn by hand, but with a slight resistance. If the bearings have just been taken up without scraping the shaft should turn, with the pet cocks open, when a moderate amount of pressure is applied to the crank. The general practice in adjusting connecting rod bearings is to set the bearing tight enough so that when the connecting rod is placed in a position at right angles to the crankshaft, a slight touch will cause the connecting rod and piston to drop into a vertical position with the piston down.

To assist readers in obtaining as a unit all information on a certain subject, MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

LUBRICATION

Mickle Guthrie.....Spiro, Okla.
Edgar Durnan, Jr.....San Francisco, Calif.
Chas. B. Shenk.....Lewistown, Pa.
K. Moosa Garage.....Eunice, La.
Ray Lodingham.....Kimball, Nebr.
J. G. Jackson.....Memphis, Tenn.
C. C. Speed.....Dyersburg, Tenn.

ENGINES

W. R. Jordan.....Norfalk, Va.
W. L. Hicks.....Ten Sleep, Wyo.
Twin Oaks Garage.....St. Paul, Minn.
Ben T. Evans Co.....Deer Creek, Minn.
Harold Denny.....Grimes, Ia.
L. Kuhlman, Reitz Auto Co.....Evansville, Ind.
Arvid Wallberg.....Chicago
Walter Shank.....Springfield, Ohio
R. J. McDowell.....Cedar Rapids, Ia.
A Reader.....Gillett, Wis.

THE ELECTRIC SYSTEM

Raymond T. Nall.....Centertown, Ky.
T. J. H.....Roanoke, Va.
J. W. Zinser.....Joliet, Ill.
A Reader.....Clearmont, Mo.
C. F. Hoelscher.....Huntsville, Ill.
Harold Denny.....Grimes, Ia.

CLUTCHES

Harry G. Debin, London Garage.....Los Angeles, Calif.
Charles J. Green.....Hamilton, Ont., Can.
James P. Lyon.....Minneapolis, Minn.
C. A. Thorpe.....Cincinnati, Ohio

REBUILDING

Bruce Delpante.....Memphis, Tenn.

OILING FORD COMMUTATOR

Q—Should the commutator of a Ford car be oiled? If it is not oiled thoroughly at all times will it cause trouble and of what nature?—C. C. Speed, Dyersburg, Tenn.

The Ford company states that oiling the commutator is a far more important factor than most drivers assume and that the commutator should be oiled well at least every 200 miles. The roller of the commutator revolves rapidly, and if it does not receive proper lubrication it will wear very quickly and will result in giving a poor contact.

Engines

"T" HEAD TYPE

Q—Could a 6-cylinder "T" head type Premium engine equipped with a Splitdorf magneto ignition and arranged to use break ignition, be placed in a 25-ft. speed boat?

2—What actual horsepower would be obtained if this engine could be run at 1000 or 1500 revolutions per minute for boat work?

3—Is the oiling system of this engine such as would give satisfaction for this work?

4—Would it be a good plan to equip this engine with the new Atwater-Kent ignition and increase the water pump capacity to give plentiful circulation?—W. R. Jordan, Norfolk, Va.

1—If a good installation is made and care taken in the design of the hull, the engine will work very well in the boat. Weight is a very important factor in boat construction and if the boat is not properly balanced it will not be very fast.

2—The N. A. C. C. rating of this engine is 48.6 hp. At 1500 r.p.m. it ought to develop about 60 hp. The engine develops about 90 hp. as a maximum and of course it is impossible to attain this hp. as the engine speed is too high for the propeller.

3—The present oiling system will give very satisfactory lubrication.

4—The cooling system will not have to be changed and so far as ignition is concerned you will have to make your choice from a comparison of the claims of the various ignition companies.

MILTON'S DUESENBERG

Q—Is the engine in Tommy Milton's Duesenberg a stock or specially-designed type?

2—Give bore and stroke, piston displacement and location of valves.—W. L. Hicks, Ten Sleep, Wyo.

1—The car with which Tommy Milton set his record had a rebuilt Duesenberg engine. We have no details of its construction, but it probably follows pretty closely to the stock design.

2—The engine was 3 by 5¼ in. bore and stroke and had 300 cubic in. displacement. The valves are in the head, but have the stems horizontal and open into a high narrow combustion head, rather like the usual combustion space on end. For operating the valves there is a camshaft on each side of the crankcase and long rockers, set vertically, connects the cams with the ends of the valve stems.

HIGH COMPRESSION EFFECT

Q—Is there danger from too high compression and what compression is con-

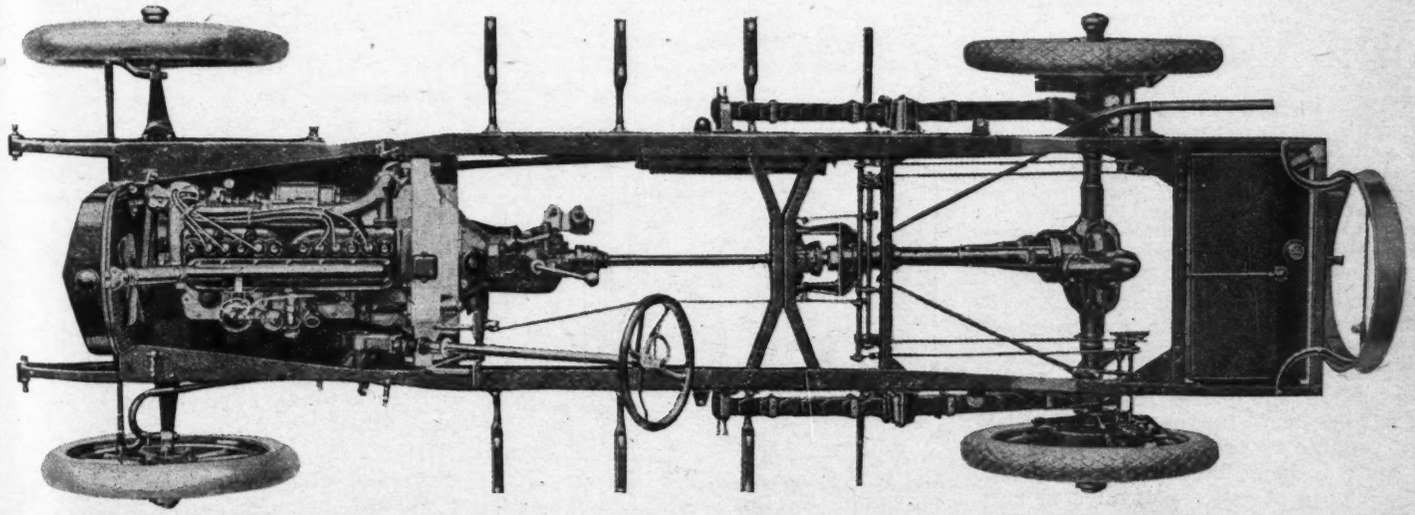


Fig. 3—Airplane view of chassis of the 1918 Paige 6-55

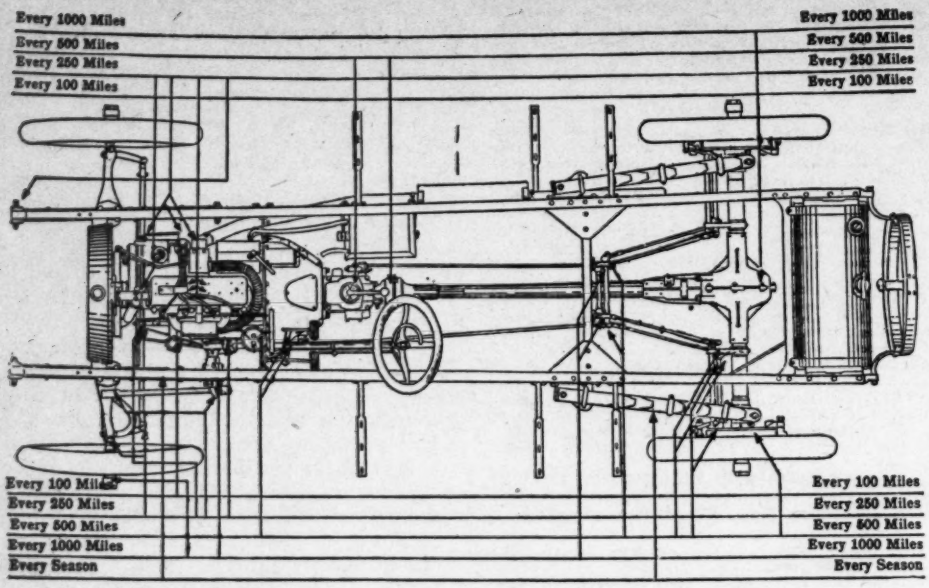


Fig. 4—Lubrication chart of the 1920 Chevrolet F.B.

sidered dangerous in a motor car engine, and what are the results?

2—Is a Burd high-compression ring and a Burd quick-seating ring and a Gill ring a good combination to use on a piston?

3—Where should an ammeter be connected on an Oakland 6-60, and what is the speed and power of this car?—Twin Oaks Garage, St. Paul, Minn.

1—At the present time engines are working at a compression pressure of about 65 to 70 lb. The higher the compression the greater the power obtained from an engine of given cylinder dimensions, and the higher the fuel economy, but when the compression exceeds a certain limit there is danger of trouble from overheating of the cylinder, self-ignition due to the heat of compression, and knocking in the bearings. It is impossible to state just what this limit is as it will vary a great deal according to the condition of the fuel used and also to the design of the engine. A few years ago engines were built with compressions as high as 100 lb. per square in., but lower compressions were found advantageous.

2—We are not in any position to recommend any combination of patented rings.

3—The system used is 24 volt and it is not possible to install one ammeter to register either the charge or discharge current.

REMOVING PISTON

We have a Detroiter eight-cylinder car, V type, one of the connecting rods was being taken off when the piston was pushed up and one of the piston rings got caught in the top of the block. Instruct how to remove the piston.—Ben T. Evans Co., Deer Creek, Minn.

The best method is shown in Fig. 5. A very thin strip of metal of approximately the same width as the piston rings is passed through one of the valve chamber openings and passed around the piston and pulled out through the other opening. It requires the services of two people and sometimes three to remove a piston stuck in this manner. The efforts of one are directed to keep the band taut under the ring and to exert an upward pull which forces that portion of the ring embraced by the metal band to fill the groove in the piston. Another person uses a pair of screw drivers, one through each valve chamber opening to compress the ring at the points indicated in the drawing. This means that a three-point compressional effect is obtained and it is a simple matter for the third person to draw the piston back into the cylinder when the ring has been properly compressed in its groove. It is not always possible to compress the ring so the only other alternative is to break it in a number of pieces by hitting the brittle ring with a drift or chisel and then withdrawing the pieces one at a time until the ring has been entirely removed.

FOUR SPARK PLUGS

Q—Would any difference in the performance of a four passenger 1918 Stutz be noted if four spark plugs per cylinder be used instead of two?

2—What is the address of the Miller Carburetor Co.?—D. H. Keiser, Jr., Reading, Pa.

1—With the spark occurring at four different places in the cylinder there would be better combustion, greater power and greater fuel economy.

2—Harry A. Miller Mfg. Co., 219 E. Washington St., Los Angeles, Cal.

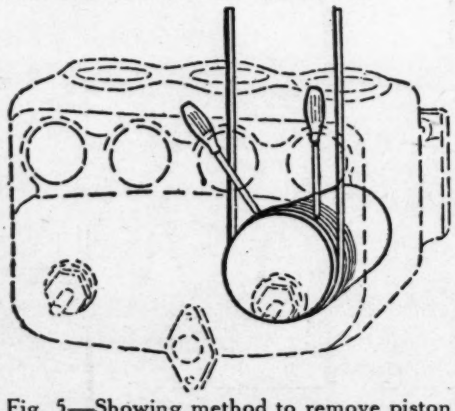


Fig. 5—Showing method to remove piston when a piston ring is caught in top of engine block

HOT-SPOT MANIFOLDS

Q—Is the idea of casting the intake and exhaust manifolds together a complete success, or is there a limit to the heat the intake manifold should get in order to prevent preignition?—Harold Denney, Grimes, Iowa.

The hot-spot manifold has proven very successful and at the present time many of the engines are using it. As the manifolds are now constructed it is impossible to heat the incoming gas to the point where pre-ignition will occur. Some types of hot-spot manifolds do not work to advantage during hot weather.

ENGINE DIFFERENCES

Q—Is there a difference in construction of the Continental engine in the Jordan and Case cars? Is the Jordan equipped with a 9-B and the Case a 9-N?—L. Kuhlman, Reitz Auto Co., Evansville, Ind.

Both the J. I. Case Co. and the Jordan Motor Car Co. use the Continental model 9-N, 3½ by 5¼ in. Red Seal. In addition the Jordan company produces a smaller car, using the Continental 7-R, which is 3¼ by 4½ in., which is designed for five-passenger cars.

FIGURING TORQUE

Q—Publish formula for figuring torque foot pound on engines.

2—How many lb. ft. torque has a Continental 9-N engine, 3½ by 5¼ in. bore and stroke.

3—Publish power curve.—Arvid Wallberg, Chicago.

1—A well designed engine should deliver 6.75 in. lb. per cu. in. piston displacement.

2—This engine gives 163 lb. torque at 1100 r.p.m.

3—The power curve was shown in the March 18 issue of MOTOR AGE.

VALVE STICKING

Q—Publish power curve of the 1916 Maxwell engine.

2—Is there ever any trouble experienced in the way of lack of power on hills due to the valves sticking on account of the lack of water jacketed space around the valves in the Buick Six engine?—Walter Shank, Springfield, Ohio.

1—This appeared in the April 1 issue.

2—We have never heard of any such trouble occurring with the Buick engine. If the water jacketed space has become clogged so that the water does not circulate properly it may cause the valves to stick. So far as we know the design of the cooling system of the Buick engine has proven highly satisfactory.

VALVE TAPPET NOISE

In answering the inquiry of Franklin C. Marshall, Cuba, Ill., in the March 21 issue we stated a possible cause and remedy for the valve noise in the 1919 Elgin 6. Since that time we have learned through one of the Elgin dealers that the keys in the valve tappets of some of the earlier 1919 models have been found to be pushed out against the guide as a result of the plug in the tappet seating too far in the tappet or because the plug seat was cut down too far so as to extend past the keyway slot. It may be possible to stop the noise by replacing the keys, or in some cases by grinding off the bottom ends of the push rods, stretching the cushing spring a trifle and straightening the

push rods. It is true that there should not be enough wear to cause any trouble under at least 10,000 miles of driving.

IMPROVING COMPRESSION

Q—The cylinders being slightly out of round on a 1913 Buick, model 31, would lapping true them up sufficiently to insure good compression?

2—What piston clearance is recommended if the cylinders have a bore of approximately 4.001 inches?

3—Would it be advisable to grind the valve seats 1-16 or 1-8 in. larger, so as to give a larger volume of fuel, and would it increase the compression?
R. J. McDowell, Cedar Rapids, Iowa.

1—If the cylinders are only slightly out of round lapping will probably true them up sufficiently to insure good compression. Should the cylinders be found .003 or .004 out of round it will be necessary to have them reground.

2—The latest recommended clearances for both iron and aluminum pistons are given in the April 15 issue of MOTOR AGE.

3—An increase of $\frac{1}{16}$ in. in the size of the valve ports would give a very slight increase of fuel volume and would have no effect on the compression at all.

STUTZ DRIVE PINION ADJUSTMENT

Q—Explain adjustment of drive pinion on a 1914 4-E Stutz so the teeth will be flush with teeth on ring gear.

2—What should be the speed of the car with 17 to 49 ratio, 34x4½ tires, stock engine with the exception of aluminum pistons and 1½-in. Miller carbureter?

3—What advantage is gained by two-spark magneto or two distributer battery system?

4—Would there be any danger of a 34x4½ straight side tire coming off at 80 or 90 m.p.h.?

5—Would an oilless bronze bushing be suitable for a clutch spindle instead of a solid one, which is very hard to lubricate?

6—How could one regulate the current output of a model O Remy generator on a 1914 Stutz?

7—Explain method of preventing oil from working out around back end of crankshaft next to flywheel.

8—Are there spark plugs manufactured in this country with platinum iridium points?—A Reader, Gillett, Wis.

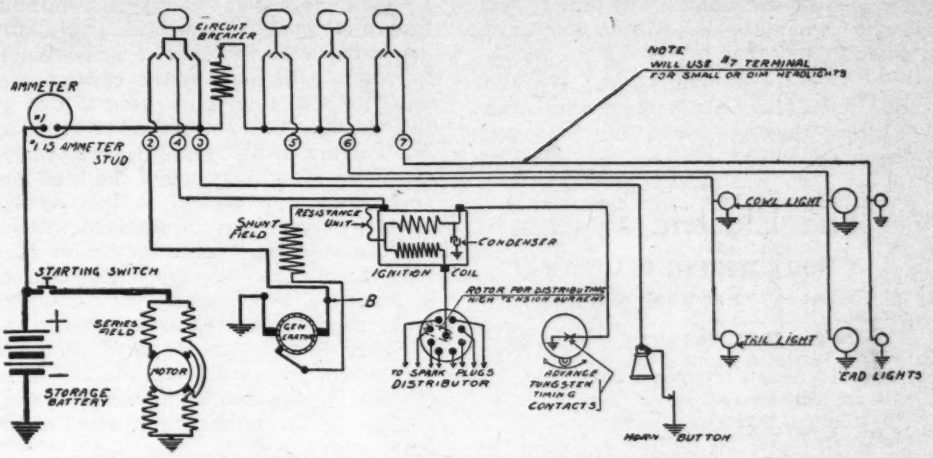


Fig. 7—Delco system on the 1916 and 1917 Oldsmobile 8, model 44

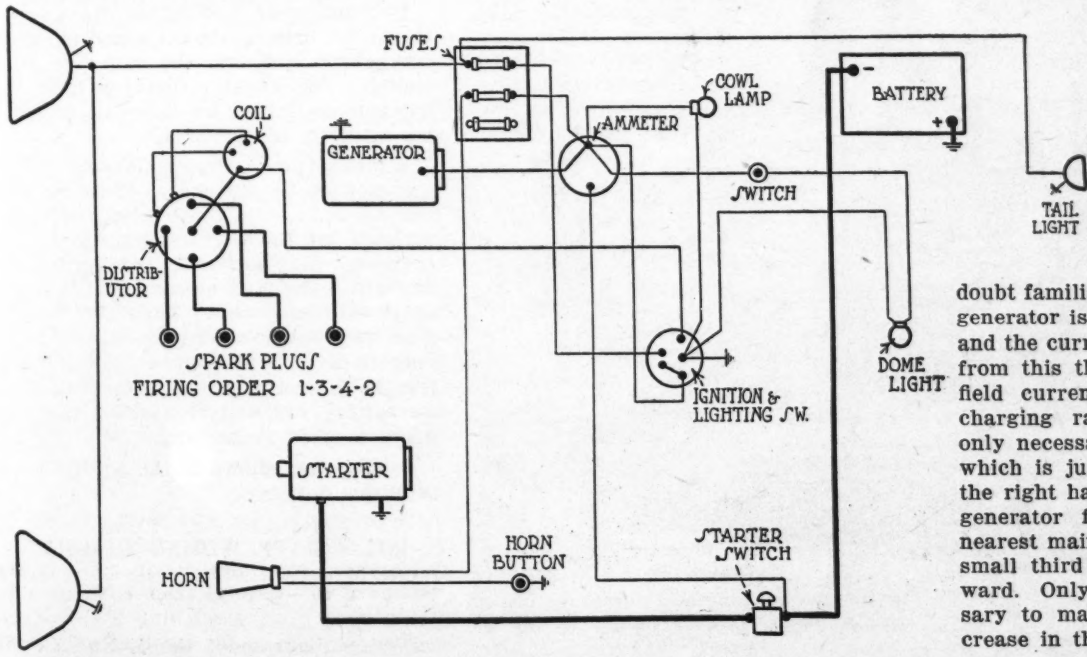
1—The assembly of the transmission slide shaft is such that it is not necessary to provide an adjustment on the pinion. You of course understand that the differential ring is adjustable by means of a collar on each side of the differential case, making it possible to move the ring gear with relation to the pinion. The only means of moving the pinion gear would be to either grind the gear off slightly on the back or else use a spacer washer between the gear itself and the transmission casing. Unless one of the differential gears has been renewed with some improperly made gear we see no reason why a new gear should be necessary.

2—Assuming that the engine attains a speed of about 2500 r.p.m., and we see no reason why it should not, the car speed would be, with 34 by 4½ in. tires and a gear ratio of 2.88 to 1, 87 m.p.h.

3—The advantage gained is that you ignite the charge from two separate sources. If, for example, a long tube containing a combustible charge, were ignited at one end a certain time would be required before the charge would be completely burned. Now, if another spark were started at the same time from the other end of the tube, the mixture would burn just twice as rapid. In actual practice, within the cylinder of an engine, such an advantage is not gained. One prominent motor car concern states that something like 25 per cent more power is obtained with such a sparking system.

4—No, we do not think so. At many of the big racing events one finds that straight side tires are used a good deal.

5—This is a question indeed. A clutch spindle obtains a good deal of rough usage. In the past it has been general to use grease and oil to lubricate this bearing, but because of the inaccessible mounting of the bearing, neglect has caused these bearings to wear out very rapidly. The oil-less bushing people have a very good argument here and experience with their bearings shows that they are holding up. Other means have been developed lately for introducing grease into these inaccessible bearings that is also proving very successful. On the whole, we think that this is a question you should decide yourself. If you use a grease type bearing be sure to grease it, and if of the other type, be sure that the bearing is large enough to take care of the load.



1919 DORT WESTINGHOUSE.

Fig. 6

6—The generator on the 1914 Stutz was equipped with a third brush and the regulation of this you are no doubt familiar with. The field coil of the generator is directly above the armature and the current for the field coil is taken from this third brush. To increase the field current, which will increase the charging rate of the generator, it is only necessary to move the third brush, which is just below the main brush on the right hand side when looking at the generator from the front, toward the nearest main brush. This means that the small third brush should be moved upward. Only a slight movement is necessary to make quite an appreciable increase in the rate.

7—It is probable that the bearing has become worn so that the oil leaks out

because of the unnaturally large clearance. A new bearing will no doubt overcome this difficulty.

8—This we do not know. We know that such plugs are being made abroad, whether they are made in this country is questionable.

The Electric System

DORT WIRING DIAGRAM

1—What is the address of the Auto Lite company?

2—Can a K.W. inductor type magneto that will light lamps, etc., be used for make and break ignition using a primary coil as well as for jump spark ignition?

3—Publish wiring diagram of the 1919 Dort.—Raymond T. Nall, Centertown, Ky.

1—This system is made by the Electric Auto-Lite Co., Toledo, Ohio.

2—Yes.

3—This is shown in Fig. 6.

MAGNETOS

Q—Explain difference between a low and high tension magneto and why are coils used?—T. J. H., Roanoke, Va.

A low-tension magneto is one which generates a relatively low electrical pressure when driven at ordinary working speed. This type of magneto can supply a greater volume of current than a high-tension magneto but at a relatively low voltage, so that the actual out of the magnetos can be about the same. A low-tension magneto is used with the make and break system of ignition and since the electrical pressure generated is so low that it is impossible to use it with jump spark ignition systems, an induction coil is used to step up the voltage. The high-tension magneto differs very little from the low-tension magneto. The armature of the high-tension magneto is wound so that a high tension current may be obtained without the use of a separate induction or high tension coil. In some types, this current is produced in an armature winding of many more turns than is provided in the ordinary low-tension magneto, while in other types a second winding is placed around the first, which serves the same purpose as the secondary winding of the high-tension coil.

AMATURE TESTING

Q—Which is the surest way of testing armatures for short circuits in the windings, the drop of potential from bar to bar, or by induction?

2—In making the induction test, what is the action of the armature? Sould one or more of the windings or coils be short circuited; or, in other words, by what means can a person distinguish the difference between good and bad coils?

3—Could an induction tester for armatures be made as follows: Take a 110-volt electric fan motor (induction) which has four poles, four fields and a laminated core? Cut the core in halves leaving two poles and two fields on each half. Use one of the halves, which would be in the shape of a half circle, for holding the armature for testing. A 55 to 70-volt incandescent bulb could be placed in series with these coils, or a 110-volt AC current, to compensate for the other two coils that will not be used.—J. W. Zinser, Joliet, Ill.

1—One of the best ways to test armatures is to use drop of potential method, measuring the drop between each bar and the next. When an accurate meter is used an exact interpretation of the condition of the armature can be obtained.

2.—The induction method does not provide any direct path of electricity through the armature. By that we mean that any current entering the coils of the armature is induced therein. This makes it rather difficult to obtain any constant voltage standard, to measure the coil with, whereas with the direct method of testing the potential between the adjacent bars of the commutator a direct path is assured, which can be made of any strength by simply varying the resistance in series with the coil.

3—While an induction machine could be made this way we do not think that it would give the very best results. An induction tester usually requires a large amount of current flowing through the primary circuit to induce into the secondary circuit, which in this case is the armature, an appreciable amount of current.

STARTING TROUBLE

Q—The engine in a 1914 Overland 79 starts on battery and runs well; when switched to magneto apparently will run all right for a time and then suddenly stops. It can be started immediately on battery. By advancing the spark engine may even be started on magneto at times. Ignition has been rewired and engine compression seems good. It has been suggested that the distributer has a short circuit but there are no cracks visible. The trouble is more pronounced going up hill. A Splitdorf dual type magneto and Remy coil and switch are used. What is the cause and remedy?

2—Publish wiring diagram of the Gray & Davis system used on this model.—A Reader, Clearmont, Mo.

1—From your description we are inclined to believe that a case of weak magneto magnets is the cause of your trouble. We suggest that you have the magnets recharged for this will increase the intensity of the spark.

A method to determine the relative intensities of the spark for magneto and battery is to start the engine and while running on the battery remove one of the spark plug terminals holding it near enough to the plug electrode so that the spark will be visible. Then run the engine on magneto and perform the same operation. If the spark is noticeably less in intensity on magneto than it is on battery you will be assured that the magnets need recharging.

2—This was shown in the April 8 issue of MOTOR AGE.

1914 MOLINE WIRING DIAGRAM

Q—Publish wiring diagram of the 1914 Moline M-40.—C. F. Hoelscher, Huntsville, Ill.

Wiring diagram of the Moline-Knight was shown in the April 8 issue of MOTOR AGE.

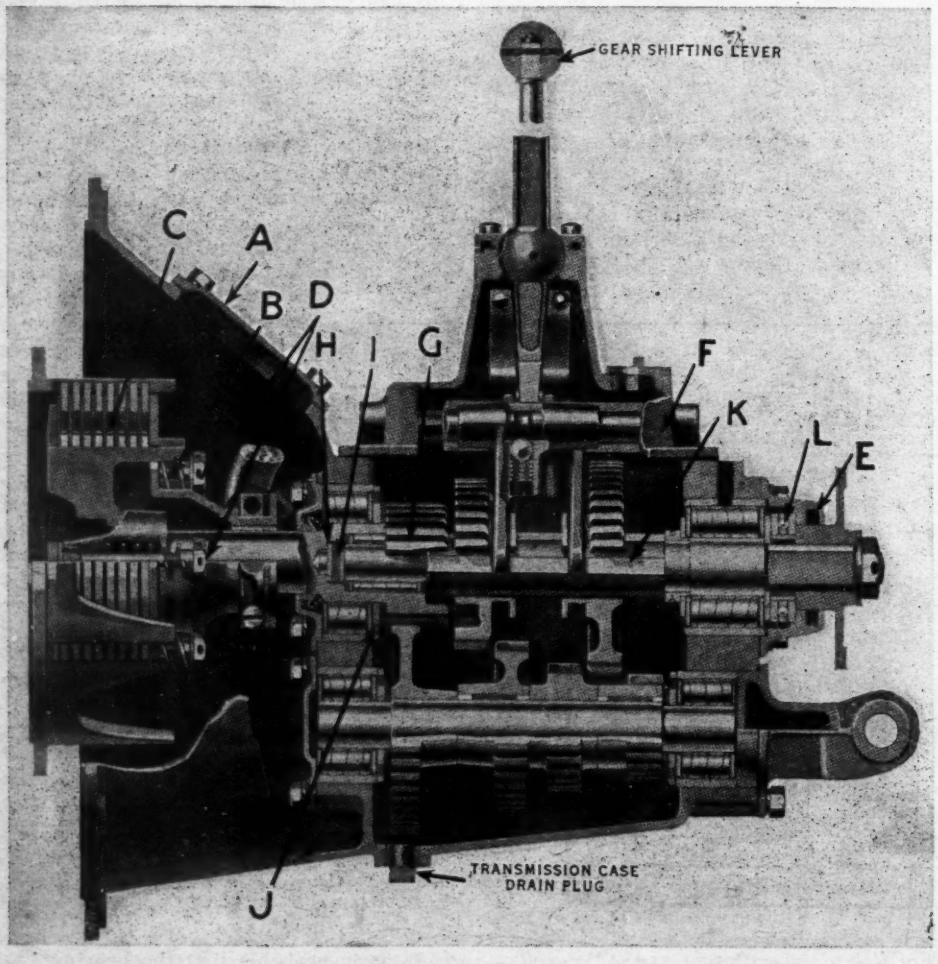


Fig. 8—Showing the transmission and clutch on the 1915 King model D

BATTERY TESTING

Q—After testing a battery one finds that the cells are not shorted, would it be advisable to refill old battery with new acid?

2—In refilling an old battery at what specific gravity reading should the acid be mixed.

3—In timing a battery system, with piston at top dead center and breakers just opening, should the contact roller be just making contact or in full contact at the time mentioned?

4—Why is a Ford timed advance while all other cars are timed retard?

5—Does the Oldsmobile 8 still have the mercury tube generator regulation? If not, when was it discontinued?

6—Publish wiring diagram of the Oldsmobile 8.—Harold Denney, Grimes, Iowa.

1—If the battery is very old it is advisable to install a new one. If the battery has been taken down and the same separators used in assembling an electrolyte of the same gravity as the old electrolyte should be used. If new separators have been used, fill with an electrolyte 50 points higher in gravity than the old electrolyte.

2—1300.

3—The contact should be in full contact.

4—We do not understand just what you mean by advance timing. The Ford is timed as follows: Bring No. 1 piston to top of the compression stroke—then move the piston down about ⅛ of an in.; place the spark lever at full retarded position—place roller of commutator on number 1 segment so it will just start to make contact with the segment. The firing order is 1-2-4-3, therefore see that the connections from commutator terminals are made accordingly.

5—This regulator was discontinued in about 1914.

6—See Fig. 7.

Clutches

CLUTCH END PLAY

Q—Instruct how to repair the clutch on a 1917 Dodge. The clutch shaft can be moved forth and back with the hand about one-quarter inch.

2—Can the clutch with shaft be taken out through hand hole in clutch housing or will it be necessary to take down propeller shaft and move transmission case out of way, or take engine out of the car. Desire to install a new facing on the disks if it is necessary to remove clutch to take up end play.—C. A. Thorpe, Cincinnati, Ohio.

1—This is probably a case of loose end thrust bearings. In order to make the adjustment it will be necessary to disassemble the clutch. The shaft cannot be removed through the hand hole in the clutch housing so the thing to do is to move the transmission out of the way so you can get it at the bearings. A diagram of the clutch assembly is shown in Fig. 9.

2—See 1.

DISMANTLING COLE CLUTCH

Q—Instruct how to gain access to the clutch and flywheel of a 1913 Cole, as a bolt seems to be loose on the flywheel.

2—This car runs excellently except at about 22 m.p.h., when quite a bit of vibration occurs in the left hand fender. Over 22 m.p.h. and less the engine runs smoothly.—Charles J. Green, Hamilton, Ontario, Canada.

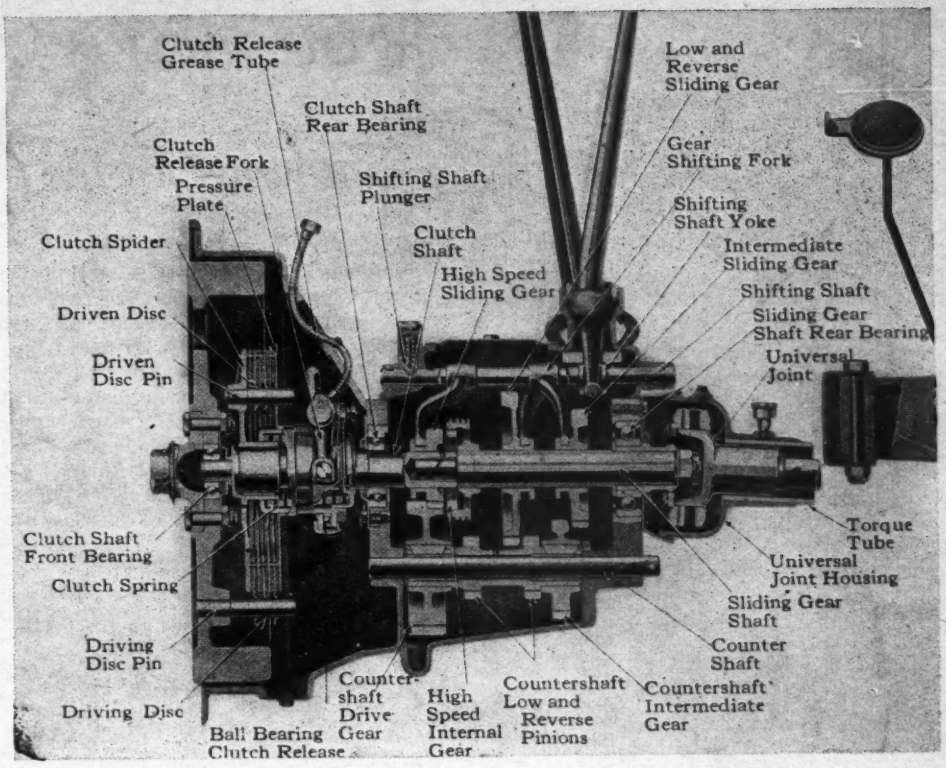


Fig. 9—The 1917 Dodge transmission and clutch

1—It will be necessary to unbolt the flywheel and transmission case and remove it. First take down the drive shaft at the forward universal. Rig some sort of a hoist to support the transmission case, preferably using a block and tackle to support it from a beam. This will prevent the case from dropping when the capscrews are removed. The case will then be in a position to be drawn backward and at the same time the clutch may be drawn out. This will permit you to get at the flywheel.

2—Look for a loose engine bolt if you are satisfied the bearings are tight, and that there is no piston slap. You can eliminate this only by the process of elimination—by going over every nut and bolt. Perhaps the crankshaft is sprung, for this will produce vibration, but this is not likely, inasmuch as it would be present at most all speeds.

RAPPING NOISE IN CLUTCH

Q—Publish cut of 1915 model King clutch. When speeding up, clutch has a sharp rapping noise. What can be done to remedy this trouble?—James P. Lyon, Minneapolis, Minn.

1—This is shown in Fig. 8. It is practically impossible to tell what the trouble is or the cause of it because of the lack of details. The trouble may not be in the clutch at all as you seem to think. Get at it by a process of elimination. Does the noise exist when the engine is idling and the clutch pedal is down? If absent the trouble is not in the clutch but probably in the engine. If the clutch releasing collar is badly worn it will manifest itself through a vibration of the clutch pedal. The noise may be a result of a broken transmission gear. Is the noise very pronounced at any particular speed, that is, in low, intermediate or high. In this way you can determine where the gear is located that is causing the trouble. If the trouble is found to be in the engine, it is probably caused by the tappets.

Rebuilding

FORD REBUILDING

Q—What concern makes special motor car frames to order?

2—Would a Ford racer be safe with a special frame made for semi-elliptic springs?

3—Would lightweight connecting rods be safe with a 2¾ to 1 gear ratio?

4—Desire to have the body built similar to DePalma's special, using a Packard radiator. How much would have to be cut off at the sides to make a good streamline with cowl and for least wind resistance?

5—Would the compression be increased by planing the base of the roof 16-valve head? If so, how much?—Bruce Delpante, Memphis, Tenn.

1—Parish & Bingham Corp., Cleveland, Ohio; McCord & Co., Chicago; A. O. Smith Corp., Milwaukee, Wis.

2—Yes.

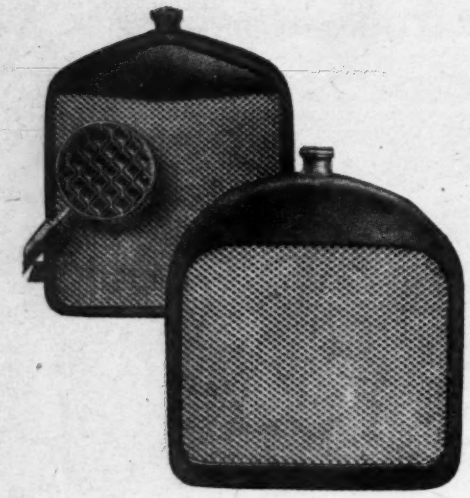
3—Yes.

4—You will have to proportion the body by trial in order to get good appearance and to have it fit the chassis properly.

5—We do not see any reason for trying to increase the compression. Rebuilt Fords using the Roof 16 valve head and some other special equipment have attained speeds as high as about 90 miles per hour. If the compression pressure is increased very much, a fuel knock is very likely to develop and you will find difficulty in starting.

The Accessory Corner

New Fitments for the Car



Ex-L radiator made for replacing the Ford radiator. The zigzag construction gives a large cooling area

Ford Steering Lock

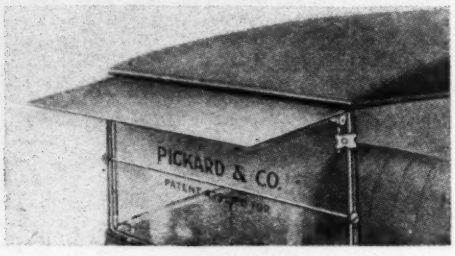
This is a new type of Ford steering lock that is placed upon the top of the steering column. With it the steering wheel can be locked in position for driving or can be locked out of position when it will turn freely without turning the wheel. The lock is of the combination type and the owner can choose any combination he wishes. It is operated by moving the three levers to the numbers that correspond to the combination. By pulling the lever out the wheel is made free and pushing it in the wheel is locked. This lock is made by Stacey H. Cosley & Co., 1112 S. Michigan Ave., Chicago.

Replacement Radiator

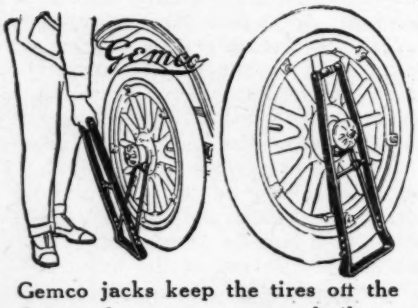
The Ex-L radiator, made for replacement for Ford cars, all models, including makes from 1909 to 1920, for the Ford truck and Chevrolet cars. The zigzag construction of the radiator provides a great amount of cooling surface, and because of the flexible arrangement of the cells a certain amount of expansion is provided which makes the radiator proof against a certain amount of freezing. These radiators are manufactured by the Auto Radiator Manufacturing Co., 1712 So. Michigan Ave., Chicago.

Gemco Tire Saving Jack

The jack shown in the illustration is designed to keep the tire off the floor while the car is in the garage. Most garage floors are damp and covered with grease and oil, which in time will rot the best of rubber. These jacks are very easy to operate and there is nothing to get out of order in any way. They are made entirely of steel, except the hub saddle, which is covered with heavy harness leather. They are instantly applied, and can also be adjusted to fit different sizes of wheels. A secure lock holds the jack in place when the wheel is raised. Gemco Manufacturing Co. has recently purchased the patent rights of this jack and will begin the manufacture of this article immediately at their Milwaukee factory. The jacks are to be made in three different sizes, small size is adaptable for Fords and other light cars; the next larger for cars weighing 1800 to 2400 lbs., and the largest one for cars over 2400 lbs.

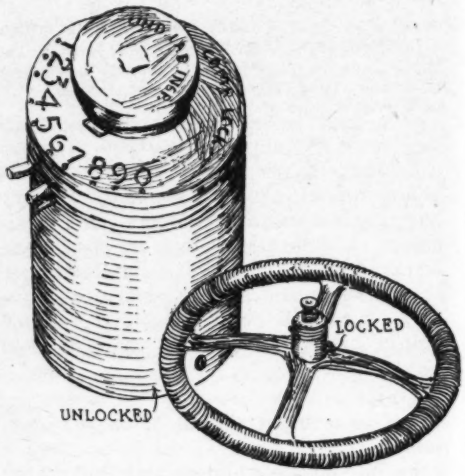


Pickard windshield protector to prevent discomfort from the sun's glare



Gemco jacks keep the tires off the floor and prevent grease and oil rotting the rubber

Cyclone water circulator for Fords driven by a belt extended from the fan pulley



Combination lock for attaching to the Ford steering wheel. The combination can be changed at will

Ford Water Circulator

The Cyclone water circulator for application on Ford cars and other cars using thermosyphon cooling consists of a small propeller like water impeller placed in the water line of the engine, and this propeller is operated by a belt placed on an extension pulley of the fan. The manufacturer claims that this water circulator will force about 5 gal. of water per minute through the radiator. This device is made by the Cyclone Mfg. Sales Co., 1112 S. Michigan Ave., Chicago.

Pickard's Windshield Protector

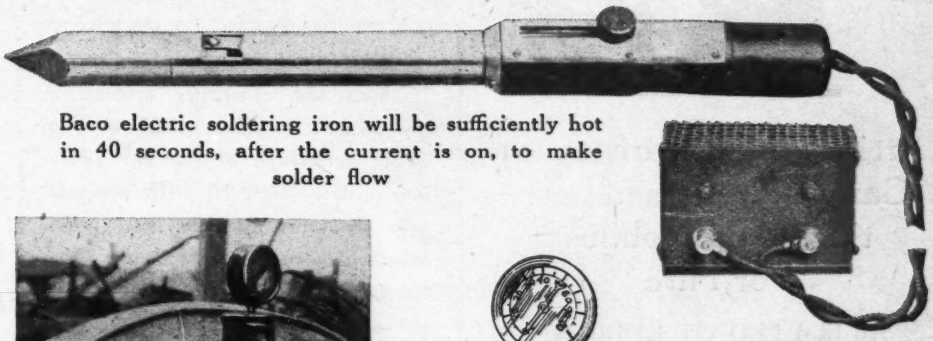
This is a windshield protector similar to the rain vision windshield, but different in that a composition covering is used instead of the glass. Its purpose is to keep the glare off the shield and those who are familiar with long drives in country where the sun glares brightly throughout the day this will come as an interesting development. The shield is adjustable and can be made to fit any car. It can be raised or lowered to suit one's vision. This shield is made by Jessop & Thompson, 1421 S. Michigan Ave., Chicago.

Service Equipment

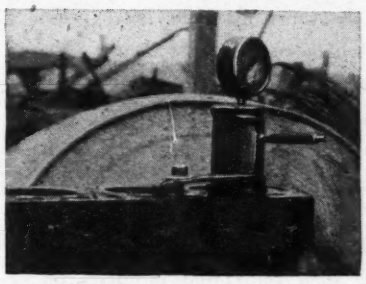
Time Savers of the Shop

Baco Electric Iron

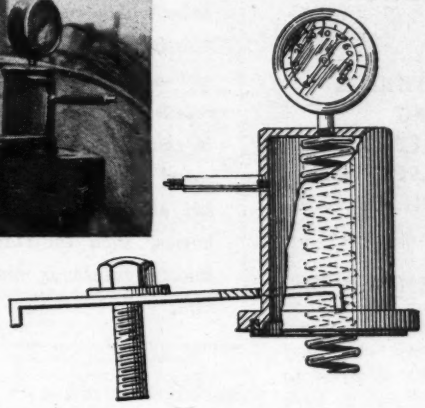
The Baco soldering iron is of the electric type, but different from the ordinary in that it obtains its heat from an electric arc within the housing. This electric iron is easily controlled by the operator, a convenient switch being so placed that one's thumb controls the arc. Within 40 seconds after the current is turned on, it is claimed solder can be made to flow from the iron. This effects a great saving in time, as with an ordinary iron the time consumed by the heating is greater than 40 seconds. Special carbons are furnished with this soldering iron, but it is not absolutely essential that one use only these special carbons for the iron will work on other carbons of the proper size. The iron is made of seamless steel tubing, with a copper head that is detachable. When using this iron it is necessary to use a 15 ampere fuse in the circuit. This iron is made by the Baco Electric Co., Dode, Iowa.



Baco electric soldering iron will be sufficiently hot in 40 seconds, after the current is on, to make solder flow



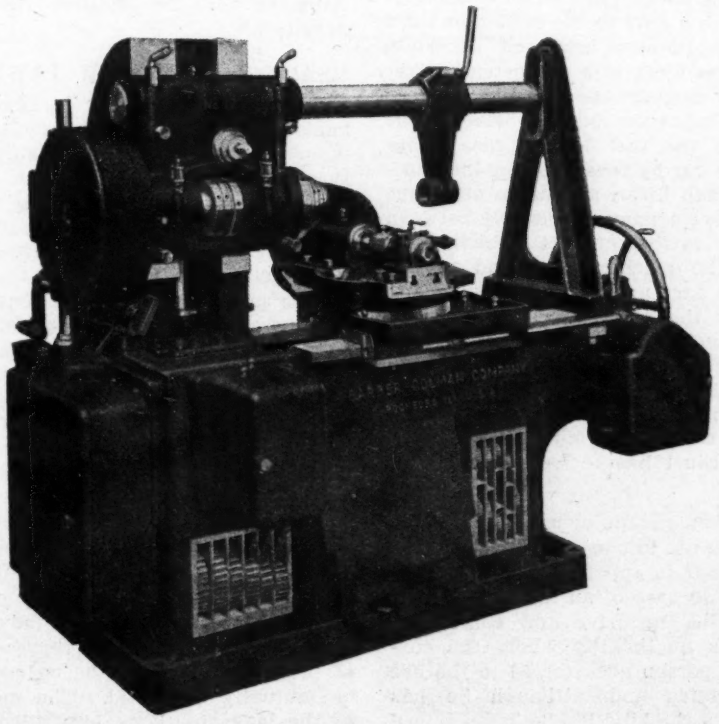
Valve tester to test accuracy of valve seat after grinding



Norwesco valve grinding compound

Norwesco Valve Grinding Compound

The Northwestern Chemical Co., Marietta, Ohio, have added to their line of nationally known automotive utilities Three-An-One valve grinding compound, holding 3 ounces coarse and 1 ounce fine. In order to grind valves quickly and uniformly, a mechanic must use a high grade compound. This compound contains no ground glass, sand or emery, but does contain a very high grade of abrasive. By removing the lid one has access to the fine grades and by removing the fine grade compartment one has access to the coarse.



Gear hobbing machine to enable the larger service stations to make certain parts

Gray-Hollenbeck Valve Tester

This is a special valve tester that makes it possible to test the accuracy of the valve seat after it is ground. The machine operates on compressed air after being secured to the top of the engine block. The cup of the tester is placed over the valve, and a spring within the cup chamber serves to hold the valve firmly to its seat. Then when the air line is connected to the valve stem, the gage registers the pressure. If after the air line is disconnected the pressure remains at its original level, it is a sign that the valve is properly seated, otherwise the air pressure will leak out.

This tester has been developed by Gray & Hollenbeck of Lentner, Mo.

Gear Hobbing Machine

As the great volume of business of the automotive industry increases large service stations will be compelled to rely far more upon their own equipment for making certain parts, because they will be able to turn out a job much quicker by making the parts than by waiting for it to come from the factory. The gear hobbing machine shown in the illustration is one of the products of the Barber-Colman Co., Rockford, Ill. This machine occupies a floor space of 43 in. by 72 in., its net weight is approximately 4000 lb.

Full details as to its construction and operation can be obtained from the factory.

Law in Your Business

By Wellington Gustin

SEEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. MOTOR AGE presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty points as may be submitted him.

Duties and Liability of Garage Keepers in Lettings Automobiles For Hire

HE IS A PRIVATE CARRIER
RULES APPLYING
DEGREE OF DILIGENCE
DUTY TO PROVIDE SAFE CAR
HIRER LIABLE FOR CARE OF CAR
MUST PROVIDE COMPETENT DRIVER

A garage keeper may keep automobiles for hire at any and all times, yet he does not come under the laws applicable to common carriers. He may choose those with whom he desires to contract and may at will refuse to hire his cars. This would not be true were he a common carrier of passengers, for these must carry all persons without discrimination. A common carrier must hold himself out to the community as such. Where a garage keeper does let out a car he is duty bound to exercise that degree of care and skill which a prudent man, having regards to the occasion or to the circumstances, would bestow in such a transaction. Being a private carrier it is said he must exercise ordinary diligence to carry his passengers safely.

When letting a car for hire to a customer, the garage keeper is bound to exercise that degree of care and skill in the selection of the car he sends, which a prudent man having regard to the circumstances, would exercise in the matter. This marks his responsibility under the law.

He is not responsible for a latent defect in the car sent, as where a brake rod breaks, but he is liable when he rents a car known to be defective. In a case on this point, the Supreme Court said: "In any business involving the personal safety and lives of others, what is due care and reasonable diligence? Clearly nothing less than the most watchful care and the most active diligence; anything short of this is negligence and carelessness, and would furnish clear ground of liability if an injury was thereby sustained."

Again, where the garageman agrees to carry a passenger to another point in an automobile which breaks down, the keeper must send another machine to get the passenger and finish the journey. In a case on this point, the passenger awaited a reasonable time, then walked back to town. But he later recovered a judgment for his pain and inconvenience in walking back to town.

LIABILITY OF HIRER FOR CARE OF MACHINE

Now the customer of the garageman is liable for the lack of reasonable care and skill in driving, and for failure to exercise such prudence and caution as the circumstances require. The garagekeeper owes a duty to the public, or third parties, to inquire into and ascertain whether the hirer is a competent driver before permitting the machine to go upon the highway; but as between the garageman and the hirer in case of injury to the car by reason of the incompetency of such hirer, and as to questions of negligence arising exclusively between the parties to the contract of hiring, the hirer of the machine is bound to use reasonable care and skill in driving and caring for the car. Unless there is a manifest incapacity of the customer to use such care and skill, it is immaterial whether the garagekeeper expected or had reason to expect that the defendant would be careless or unskillful or not. Thus the court has so held in a recent case.

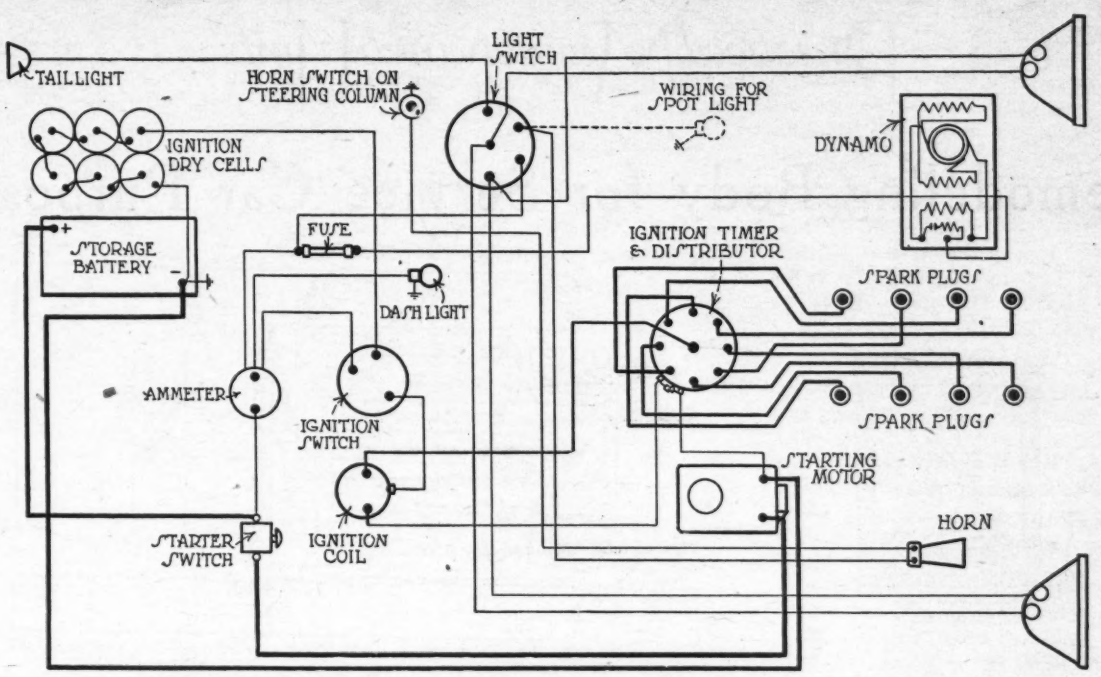
Neither is a garage owner liable where he rents his car to one who drives it himself, unless it is apparent that the hirer is unfit, as in case of an intoxicated person or child, to drive and control it. So there is no liability where the customer is a person accustomed to the use of automobiles and, although he has never driven the kind let, he has received instruction in handling it. Further the customer is responsible to the garagemen and to the public for the acts of his own servants or employees, and in addition such servants or employees of the hirer are responsible to the garageman for their wrongful acts and negligence because they are active wrong-doers to the agreement of hiring of their master. Where the garage keeper provides a driver for the machines he hires out, it becomes his bounden duty to exercise reasonable care in making a selection, and prudence demands that he shall select and send in charge of the machine only competent drivers, having regard to the circumstances of the particular occasions. On this point, the court in an Illinois case, laid down the rule, defining the duty that will be applied to the private carrier of passengers. It said in part:

"It was the duty of appellant, as a carrier of passengers, to furnish a driver competent, skillful and careful; Tuller vs. Talbot, 23 Ill. 357, . . . ; and to use that care, viligance and foresight under the circumstances and in view of the service undertaken and the mode of conveyance adopted, as would reasonably guard against and prevent accidents and consequent injury to passengers; and slight neglect or want of care in this regard, created liability to respond in damages for the injuries thereby occasioned."

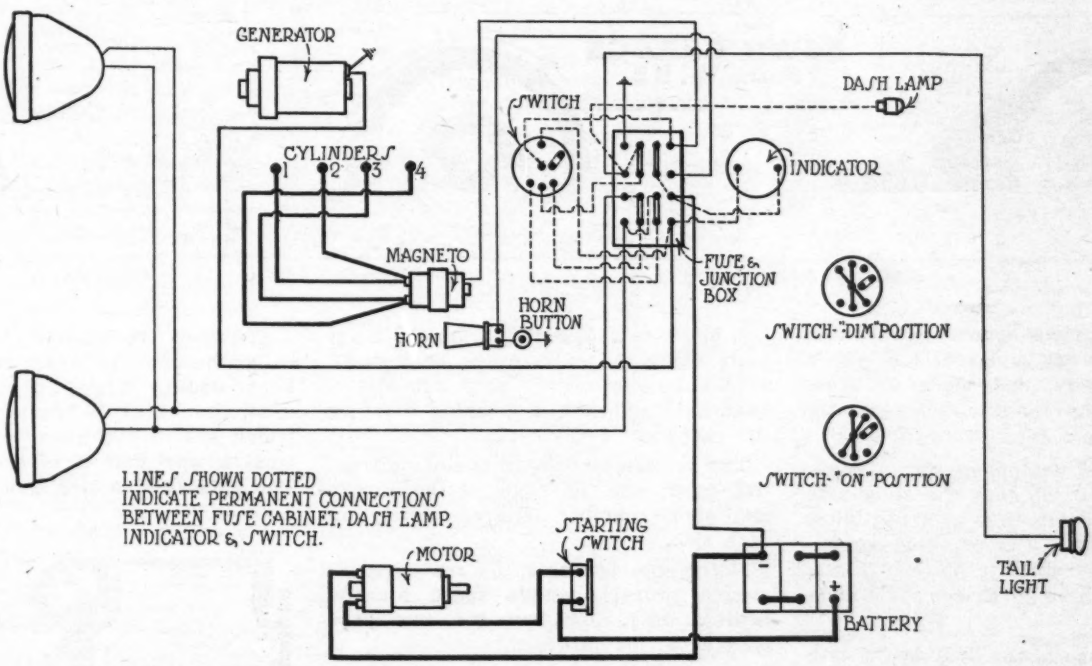
DEALERS TO WATCH LAWMAKERS

Jacksonville, Ill., May 7—The new organized Automotive Dealers' association of Jacksonville has gone a step farther than most organizations of this kind. It was voted at a recent meeting that two members attend every session of the city council and be ready to explain any matter affecting the interests of the dealers or the motoring public in general, and also to see that any action detrimental to this class be prevented if possible, or minimized. The old adage, "what is everybody's business is nobody's business" is a misnomer as far as the Jacksonville live wires are concerned. They propose to see that nothing is slipped over by the commissioners affecting the dealers or persons who own motor vehicles without all concerned being duly apprised in advance. It is believed by the dealers that the commissioners will welcome co-operation and advice and that the presence of the representatives of the association will be welcomed and be mutually beneficial. The new stunt by the Jacksonville dealers will no doubt be watched with interest by those in other cities of the middle west.

Motor Age Weekly Wiring Chart No. 77



1918-1919 PEERLESS 56 AUTOLITE



1916 JEFFERY -462- BIJUR

THIS WEEK

1916 Jeffery

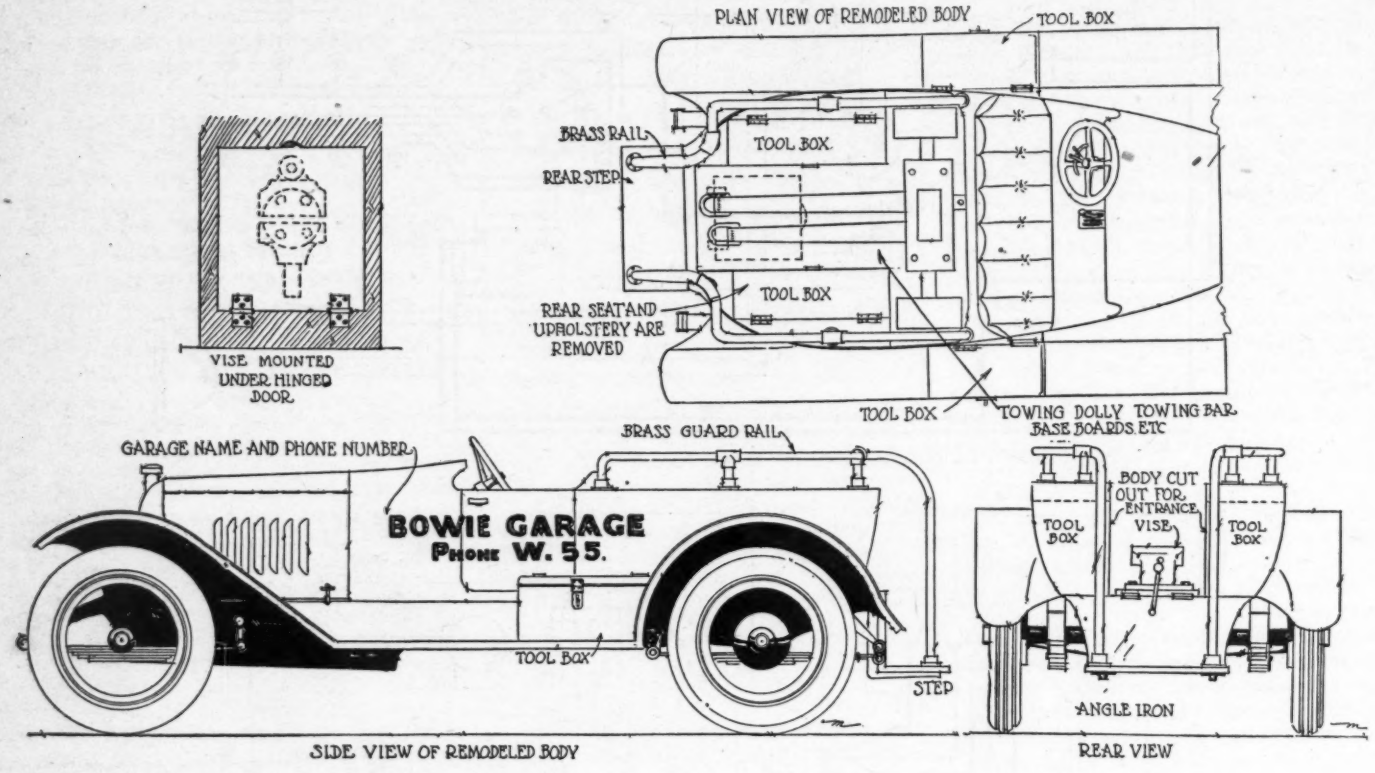
1918-1919 Peerless

Allen—Dec. 18, '19
Auburn—Nov. 27, '19; April 1, '20
Briscoe—May 6, '20
Cadillac—April 22, '20
Crow-Elkhart—April 22, '20
Chalmers—Nov. 27, '19
Cutting—Nov. 6, '19
Daniels—Dec. 4, '19
Davis—Dec. 4, '19
Dixie—April 1, '20
Dodge—April 15, '20
Dorris—Dec. 11, '19
Dort—March 25, '20
Elcar—May 6, '20
Essex—May 15-22, '19
Franklin—Dec. 11, '19
General Battery Charging—Sept. 25, '19
General Magneto Diagram—June 5, '19
Grant—April 29, '20
Internal Connections—July 10-17-24, '19
Keeton—Nov. 6, '19
Lexington—Jan. 1, '20
Liberty—Jan. 1, '20
Marmon—Dec. 25, '19; Jan. 22, '20
Mercer—Nov. 27, '19; March 25, '20
Mitchell—Jan. 8, '20
Moon—Jan. 29, '20; March 11, '20
Moore—March 4, '20
Nash—March 11, '20
National—Feb. 12, '20
Oakland—April 15, '20
Oldsmobile—April 8, '20
Olympian—Jan. 22, '20
Packard—March 18, '20
Paige—July 3, '19; April 29, '20
Pierce-Arrow—Feb. 5, '20
Pilot—March 4, '20
Premier—Dec. 18, '19; Feb. 26, '20
Reo—Nov. 13, '19
Roamer—March 18, '20
Saxon—April 8, '20
Scripps-Booth—Jan. 15, '20
Stearns-Knight—Jan. 8, '20
Stephens—Feb. 12, '20
Studebaker—Dec. 25, '19
Stutz—Feb. 5, '20
Templar—Jan. 29, '20
Velie—Feb. 19, '20
Westcott—Jan. 15, '20
White—Feb. 19, '20
Willys-Knight—Feb. 26, '20
Special Systems for Fords—May 15-22, '19

The Automotive Repair Shop

Practical Maintenance Hints

Remodeling Body for Service Car Purposes



The small garage owner is reluctant about putting out a large sum for a service car body, and made to order bodies cost considerable sums at the present time.

The body and equipment shown below is a remodeling job that the shop man can do in his spare time at a negligible cost. This body is a resurrected passenger body of any obsolete pattern that is available or can be purchased for a nominal sum.

The alterations of the body begin with the removal of the rear seat and the rear upholstering, top and top irons. The front seat is left intact, but the windshield should be removed, inasmuch as the uses to which a service car are put make the glass shield dangerous.

Two large tool boxes are built into the rear, one at each side. The rear panel of the body is cut out about 30 in. wide. A wooden step secured on angle iron is mounted on the rear end of the body. Two smaller tool boxes are placed on each side on the running boards. A hinged door in the floor provides a place for the vise, that stows it away, yet permits it to be brought out for use almost instantly.

A brass rail extending from the front seats along the edge of the body down to the bottom of the step provides a hand hold and adds a finishing touch to the car when kept bright.

The car can be painted in some attractive color, and the name of the garage and phone number lettered plainly on each side.

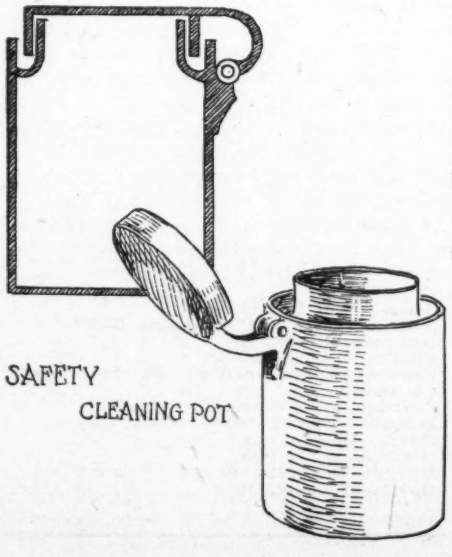
If the tool boxes in the rear are arranged properly ample space for the towing dolly, tow bar and two base planks can be provided.

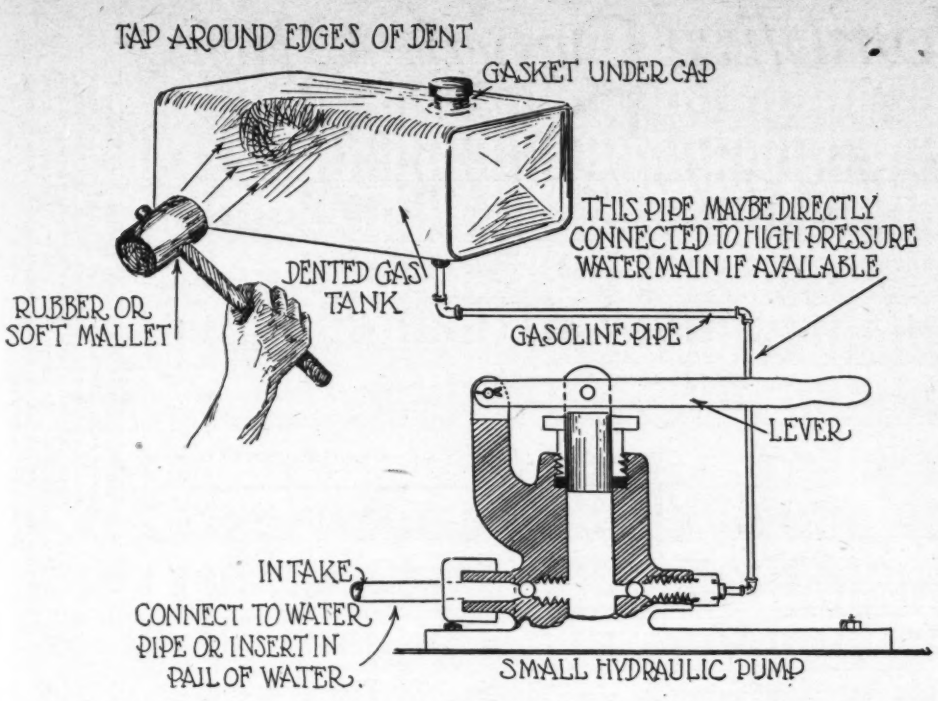
Safety Cleaning Pot

Good workmanship in the shop demands clean parts. When a unit is being assembled after overhaul, every working part must be scrupulously clean.

To this end the Cadillac service station in Detroit have cleaning pots filled with kerosene within easy reach of every workman. There are several on the benches and several more on the floor so that no matter where a workman is or what he is doing there is a cleaning pot right at hand. This, of course, is a splendid aid in obtaining clean parts for assembly.

The pots themselves are a special safety design and when not in use are kept closed. They are made of cast aluminum with a heavy hinged cover which fits into a groove in the pot in such a way that it is securely sealed. The pots vary in size from about 1½ to 3 gal.




TAP AROUND EDGES OF DENT
GASKET UNDER CAP
THIS PIPE MAYBE DIRECTLY CONNECTED TO HIGH PRESSURE WATER MAIN IF AVAILABLE
DENTED GAS TANK
RUBBER OR SOFT MALLET
GASOLINE PIPE
LEVER
INTAKE
CONNECT TO WATER PIPE OR INSERT IN PAIL OF WATER.
SMALL HYDRAULIC PUMP

Repairing dented gasoline tanks by the use of hydraulic pressure applied internally

Repairing Dented Gasoline Tanks

Fairly good results can be obtained in repairing or straightening dents in gasoline tanks without removing them from the car. A rubber mallet and a small hydraulic pressure pump are the tools required for this work.

Disconnect the gasoline pipe at the vacuum tank or carbureter and connect the hydraulic pump at this place. Screw the tank filling cap down tight, placing a leather gasket under the seat, if one is not in that place. The tank should be filled entirely with water, shaking the car to bring out all the air bubbles before screwing down the filler cap.

A few strokes of the pump, or enough to give about 40 lbs. pressure. Tap smartly around the edges of the dent with the rubber mallet and the part gradually bulges back. Alternately pumping up the pressure and beating around the dent, will bring the tank back to its previous shape.

Details of a Jack for the Repair Car

The jack shown in the sketch is suitable for use around the garage or for the repair car. The advantage of this rigging is that a wrecked car can be raised to any desired height for attaching to the end of the wrecker when it must be pulled to the garage, or in the shop the front or rear end of a car is to be elevated sufficiently to remove springs or axles, sometimes a lift of two or three feet.

In the sketch a wooden construction is shown. However, steel plates can be used, making the jack much more substantial. The same principles will apply to either construction. The manner of using this device is to place the lifting end of the lever or bar under the object to be raised, shifting the pins after each downward movement of the prying end of the bar.

To hold the part after being raised the pin is placed in the rear hole over the bar. Without including the two pins the jack consists of one pry bar and three pieces of heavy planking securely bolted together and drilled for the pins.

Clean Threads on the Lathe Face Plate

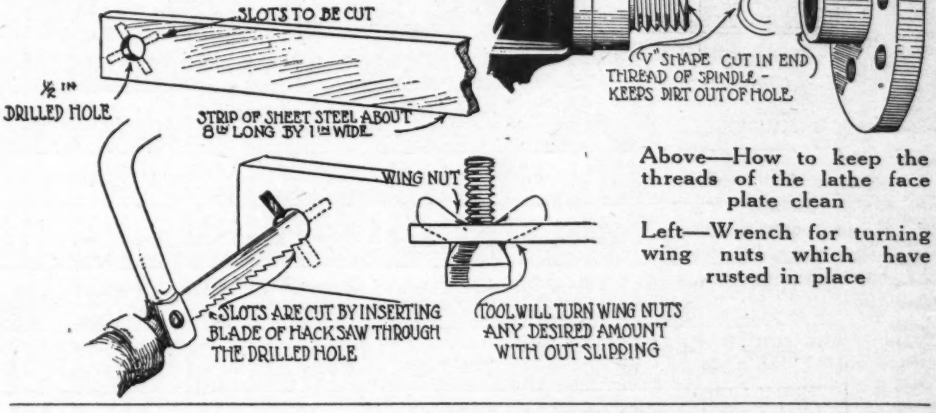
Where the threads in the lathe face plate are clogged with dirt the plate is difficult to screw on and also is not likely to be true.

A V cut made in the end thread of the face plate lug will keep the thread clean. This cut is made with a triangular file in the end thread. This scraping edge should be cleaned of the dirt occasionally that it gathers from the threads.

Wrench for Wing Nuts

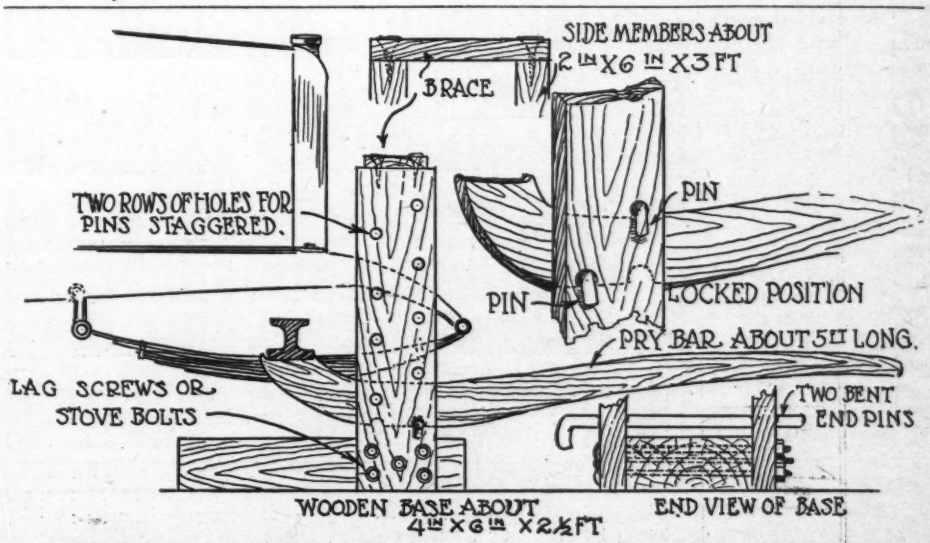
Wing nuts on brake bands and levers are difficult to adjust with the hands, especially after they have rusted on. A simple tool that avoids bruising the knuckles when pinchers are used and these will slip, is shown in the sketch. This is made from a strip of sheet steel, about 8 in. long and 1 in. wide. Drill a hole through one end to pass over the screw.

To cut the diagonal slots as shown, pass the blade of the hack-saw through the hole and saw these slots.


SLOTS TO BE CUT
½ IN DRILLED HOLE
STRIP OF SHEET STEEL ABOUT 8 IN LONG BY 1 IN WIDE
WING NUT
SLOTS ARE CUT BY INSERTING BLADE OF HACK SAW THROUGH THE DRILLED HOLE
TOOL WILL TURN WING NUTS ANY DESIRED AMOUNT WITH OUT SLIPPING
LATHE HEAD STOCK
FACE PLATE
"V" SHAPE CUT IN END THREAD OF SPINDLE - KEEPS DIRT OUT OF HOLE

Above—How to keep the threads of the lathe face plate clean

Left—Wrench for turning wing nuts which have rusted in place


SIDE MEMBERS ABOUT 2 IN X 6 IN X 3 FT
BRACE
TWO ROWS OF HOLES FOR PINS STAGGERED.
PIN
PIN
LOCKED POSITION
PRY BAR ABOUT 5 FT LONG.
LAG SCREWS OR STOVE BOLTS
TWO BENT END PINS
WOODEN BASE ABOUT 4 IN X 6 IN X 2½ FT
END VIEW OF BASE

The advantage of this jack is that a wrecked car can be raised to any height for attaching to the end of the wrecker

Motor Age Monthly Guide to Truck Specifications

These tables are revised and brought up to date monthly

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
A & B 3T	3	.....	48x3½d	48x3½d	Own	4-5 .17x4½	Bosch	none	none	Scheb	none	Own	in-g	Own	Gem
A & B 5T	5		48x3½d	48x5d	Own	4-5 .17x4½	Bosch	none	none	Scheb	none	Own	in-g	Own	Gem
Acason R	1	$2,400	36x3½	36x5	Wauk.	4-3½x5½	Eise.	.....	Wauk.	Marvel	Fuller	Fuller	worm	Timkn.	Ross
Acason RB	1½	2,650	36x3½	36x6	Wauk.	4-3½x5½	Eise.	.....	Wauk.	Marvel	Fuller	Fuller	worm	Timkn.	Ross
Acason H	2½	3,850	36x4	36x8	Wauk.	4-4½x5½	Eise.	.....	Wauk.	Marvel	Detlaff	Cotta	worm	Timkn.	Ross
Acason L	3½	4,900	36x5	40x5d	Wauk.	4-4½x6½	Eise.	.....	Wauk.	Marvel	Detlaff	Cotta	worm	Timkn.	Ross
Acason M	5	5,850	36x6	40x6d	Wauk.	4-5x6½	Eise.	.....	Wauk.	Scheb.	B &B.	Cotta	worm	Timkn.	Ross
Acason Tractor	6	.....	36x4	36x7	Wauk.	4-4½x5½	Eise	.....	Wauk.	Scheb.	B &B.	Cotta	worm	Timkn.	Ross
Acason Tractor	10	.....	36x5	40x5d	Wauk.	4-4½x6½	A-K	West	Pierce	Scheb.	M.&E.	Cotta	worm	Timkn.	Ross
Ace	1½	.....	34x3½	34x5	Buda	4-4½x5½	A-K	West.	Pierce	Scheb.	M.&E.	Cotta	worm	Timkn.	Ross
Ace	2½	.....	36x4	36x7	Buda	4-4½x5½	A-K	West.	Pierce	Scheb.	M.&E.	Cotta	worm	Timkn.	Ross
Ace	3½	.....	36x4	36x7	Buda	.....	Eise.	G&D	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Ace	5	.....	36x4	36x7	Buda	.....	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme B	1	2,175	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme F	1½	2,375	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme A	2	3,050	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme C	3½	4,050	36x5	40x5d	Cont.	4-4½x5½	Eise.	.....	Cont.	Ray.*	B.&B.	B.Lipe	in-g.	Russel	Ross
Acme E	5	5,150	36x6	40x6d	Cont	4-4½x6	Wag.	.....	Pharo	Strom.	B.&B.	G.Lees	in g.	Torbn.	Ross
Air.O.Flex C	1½		36x3½	36x5	Buda	4-3½x5½	Simms	none	none	Strom.			in g.	Torbn.	Ross
All-American	1	1,595	33x4*	32x4	H-S	4-3½x5	Simms	.....		Strom.			in g.	Torbn.	Ross
All-American	1½	1,895	34x4	34x5	H-S	-3½x5	Simms	.....		Zenith	Detlaff	Cotta	worm	Timkn.	Ross
All-American	2½	2,195	34x4	34x6	H-S	-3½x5	Eise.	West.	Mon.	Strom.	Fuller	Fuller	in g.	Torbn.	Lavn.
All-American	3½		36x6	36x10	Cont.	4-4½x5½	A-L	A-L	none	Strom.	Fuller	Fuller	in g.	Torbn.	Lavn.
All-Power C	1	1,495	33x4	32x3½	Bdua	4-3½x5½	A-L	A-L	none	Strom.	Fuller	Fuller	in g	Torbn	Lavn.
Apex C	1½	1,695	32x3½	32x4	Buda	4-3½x5½	Eise.	Eise.	Duplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Apex D	2½	2,450	36x4	36x6	Buda	4-4½x5½	Bosch	none	none	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Apex E	3½		36x4	36x4d	Cont.	4-4½x5½	Bosch	none	none	Zenith	B-Lipe	B-Lipe	worm	Torbn.	Ross
Armleder HW	3½	.....	36x5	36x5d	Cont.	4-4½x5½	.....	West.	.....	.....	Fuller	Fuller	in-g.	Timkn.	Gem.
Armleder KW	1	.....	34x4½	36x6	.....	4-3½x5½	.....	.....	.....	Strom.	.....	.....	.....	Timkn.	Gem.
Atco IG.10	¾					3½x5					Zenith	B-Lipe	worm	Timkn.	Gem.
Atlas	2½	3,375	36x4	36x4d	Cont.	4-4½x5½	Berl.	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Atterbury 7CX	3½	4,175	36x5	40x5d	Cont.	4-4½x5½	Berl.	none	Mon.	Zenith *	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Atterbury 7D	5	5,575	36x5	40x6d	Cont.	4-4½x6	Berl.	Delco	Cont.	Strom.	Own	Own	d-rd.	Own	Own
Atterbury 8E	2	2,300	34x4	34x5	Own	2-4½x4½	Bosch	none	none	Strom.	Own	Own	d-rd.	Own	Ross
Autocar 21UF	2	2,400	34x4	34x5	Own	2-4½x4½	Bosch	Opt.	Pierce	Strom.	Detlaff	Cotta	Worm	Wis.	Ross
Autocar UG21	1½	2,550	36x3½	36x5	Herc.	4-4x5½	Bosch	Opt.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timk.	Ross
Available H-1½	2½	3,250	36x4	36x8	Cont.	4-4½x5½	Bosch	Opt.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timk.	Ross
Available H-2½	3½	4,200	36x5	40x5d	Cont.	4-4½x5½	Bosch	Opt.	Cont.	Strom.	B-Lipe	B-Lipe	worm	Savage	Ross
Available H-3	5	5,575	36x6	40x10	Cont.	4-4½x6	Bosch	Opt.	Wauk.	Strom.	B-Lipe	B-Lipe	worm	Timk.	Ross
Available H-5	7	6,000	36x6	40x14	Wauk.	4-5x6½									
Available H-7															
Beck 1-ton	1	1,650	34x3	34x3	Cont.	4-3½x5	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
Beck A	1½	1,850	34x3½	34x5	Cont.	4-3½x5	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
Beck B	(1½	2,050	34x3½	34x6	Cont.	4-3½x5							in g.	Clark	Lavn.
Beck C	(2	2,450	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
	(2½												worm	Shel.	Lavn.
Beck D	(3	3,700	36x5	36x5d	Cont.	4-4½x5½								Russel	
	(3½														
Bell	1½	.....	32x3½	32x4	Buda	4-3½x5½	Eise.	.....	Duplx.	Strom.	B.&B.	.....	.....	Russel	Gem.
Bell O	2½		34x4	34x6	Buda	4-4½x5½	Eise.	.....	Duplx.	Strom.	B.&B.	G-Lees	in g.	Clark	Lavn.
Belmont AA	1½	1,150	31x4	31x4	Cont.	4-3½x5	Conn.	Dyn.	Pierce	Zenith	G-Lees	G-Lees	in g.	Clark	Lavn.
Belmont BB	1½	1 950	34x4½	36x5	Cont.	4-3½x5½	Eise.	Dyn.	Pierce	Zenith	G-Lees	Fuller	in g.	Torbn.	Ross
Bessemer G	1	1,600	34x3	34x4	Cont.	4-3½x5	Bosch	Opt.	none	Ray.	B.&B.		in-g.	Torbn.	Ross
Bessemer H-2	1½	2,085	36x3½	36x5	Cont.	4-3½x5	Bosch	Opt.	Pierce	Ray.	B.&B.	B-Lipe	in g.	Torbn.	Ross
Bessemer J-2	2½	2,785	36x4	36x4d	Cont.	4-4½x5½	Bosch	Opt.	Pierce	Ray.	B.&B.	B-Lipe	in-g.	Torbn.	Ross
Bessemer K-2	4	4,285	36x5	36x10	Cont.	4-4½x5½	Bosch	G&D	none	Zenith	B.&B.	Det.	bevel	Stan.P	Ross
Bethlehem K	¾	1,495	34x4½	35x5	Own	4-3½x5	A-K	G&D	Pierce	Strom.	B.&B.	Det.	in-g.	Russel	Lavn.
Bethlehem DG	1½	2,095	34x3½	34x5	Own	4-4x5½	A-K	G&D	Pierce	Strom.	B.&B.	Det.	in-g.	Russel	Lavn.
Bethlehem EH	2½	2,495	34x4	34x6	Own	4-4½x5½	A-K	G&D	Pierce	Strom.	B.&B.	Det.	in-g.	Russel	Lavn.
Bethlehem FJ	3½	3,595	34x4	34x5d	Own	4-4½x5½	Bosch	non	Pierce	Strom.	B.&B.	B-Lipe	worm	Timkn.	Ross
Betz	2½	2,700	36x4	36x7	Buda	4-4½x5½	Bosch	none					in g.	Own	Gem
	5		36x6	36x6	Own	4-4½x5½							worm	Shel.	Ross
Bollstrom A	1	1,500	33x4½*	33x4½*	Wis.	4-3½x5	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Brinton H	1½	3,400	36x4	36x6	Cont.	4-4½x5½									
Brinton F	2½														

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Duplex Limited A	1½	2,575	35x5	38x7	Hink.	4-4x5½	West.	West.	.....	Strom.	Covert	Covert	worm	Shel.	Ross
Duty	2	1,695	34x3½	34x5	Gray	4-3½x5	Simms	.....	.....	Zenith	.....	Covert	.....	Russel	.....
Eagle	2		34x3½	34x6	Buda	4-3½x5½	Eise.	.....	.....	Zenith	Covert	Covert	worm	Lavn.	Jacox
Economy T-LHD	¾	1,250	35x5	35x5	Own	4-3 1½x5½	A-L	A-L	none	none	Zenith	Warner	in-g.	Torbn	Jacox
Elmira C	1½		29x3	28x3	Perk.	4-3½x4	A-K	Carl.	none	Holl.*	Own	Own	bevel	Own	Own
Ellsworth 25-A	1½	.....	30x3½	30x5	Lyc.	4-3½x5	Conn.	.....	none	Car.	Lyc.	G-Lees	bevel	Own	Foster
Erie	1½	.....	34x3½	36x5	Buda	4-3½x5	Bosch	.....	Pierce	Strom.	.....	.....	worm	Wis.	.....
Erie	2	.....	34x3½	36x5	Buda	4-4½x5½	Bosch	.....	Pierce	Strom.	.....	.....	worm	Tinkm.	.....
Erie	2½	.....	34x4	36x5	Buda	4-4½x5½	Bosch	.....	Pierce	Strom.	.....	.....	worm	Timkn.	.....
Erie	3½	.....	36x5	40x5d	Buda	4-4½x5½	Bosch	.....	Pierce	Strom.	.....	.....	worm	Timkn.	.....
														Timkn.	.....
Fageol	1½		34x3½	34x6	Wauk.	4-3½x5½	Dixie	opt.	Wauk.	Zenith	B.&B.	Own	worm	Stand.	Ross
Fageol	2½	3,400	34x4	36x7	Wauk.	4-4½x5½	Dixie	opt.	Wauk.	Zenith	B-Lipe	Own	worm	Timkn.	Ross
Fageol	3½	4,500	36x5	36x5d	Wauk.	4-4½x6½	Dixie	opt.	Wauk.	Zenith	B-Lipe	Own	worm	Timkn.	Ross
Fageol	5	5,300	36x6	40x6d	Wauk.	4-4½x6½	Eise.	.....	Mon.	Strom.	Fuller	Own	worm	Timkn.	Ross
Fageol	1		36x3½	36x4	Cont.	4-3½x5	Eise.	.....	Mon.	Ray.	Fuller	Fuller	in-g.	Clark	Ross
Famous B-10	1½		36x3½	36x5	Cont.	4-3½x5	Bosch	none	Pharo	Zenith	B.&B.	Own	worm	Russel	Jacox
Famous B-12	2	2,200	36x4	36x6	Cont.	4-3½x5	Eise.	A-L	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Fargo P	1	2,400	35x5*	36x6*	Cont.	4-3½x5	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal SD	1½	2 600	36x3½	36x7	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal TE	2	2,900	36x4	36x7	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal UE	3	3,050	36x4	36x7	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal Trac	3½	3,850	36x5	36x6d	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Own	Own
Federal WD	5	4,550	36x6	40x6d	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Shel.	Ross
Federal XC	7	4,025	36x5	36x5d	Cont.	4-4½x5½	Own	.....	.....	opt.	Own	Own	worm	Shel.	Ross
Federal Trac	1	600	30x3½*	32x4½*	Own	4-3½x4	Duplx.	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Ford TT	1	2,100	36x3	36x4	Cont.	4-3½x5	Bosch	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	1	2,375	36x3½	36x5	Cont.	4-3½x5	Bosch	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	1½	2,750	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	2	3,450	36x4	36x8	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	M.&E.	Cotta	bevel	Own	Ross
Forschler	3	4,500	36x6	36x6	Cont.	4-4½x5½	Eise.	.....	.....	Carter	B.&B.	Own	in-g.	Russel	Lavn.
F. W. D. B	3	1,850	34x3½	24x5	Wis.	4-3½x5 ½	Simms	.....	.....	Carter	B.&B.	.....	in-g.	Russel	Lavn.
Fulton FX	1½	2,350	34x4	34x6	H-S	4-3½x5	Simms	.....	.....	Carter	B.&B.	.....	.....	.....	.....
Fulton C	2														
Gabriel C	1	2,000	35x5	35x5	Buda	4-4½x5½	Bosch	L-N	none	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Gabriel E	2	3,250	36x4*	36x7*	Buda	4-4½x5½	Bosch	L-N	Dyplx.	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Gabriel F	4	4,300	36x5	40x6d*	Buda	4-4½x6	Bosch	L-N	Duplx.	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Garford 25	1¼	2,090	36x3½	36x4	Buda	4-3½x5½	Split.	West.	Mon.	Strom.	B-Lipe	Own	worm	Timkn.	Ross
Garford 70-H	2	3,190	36x4	36x7	Buda	4-4½x5½	Split.	West.	Duplx.	Strom.	B-Lipe	Own	worm	Timkn.	Ross
Garford 77-D	3½	4,190	36x5	36x5d	.....	4-4½x6	Split.	.....	Duplx.	Ray.	B-Lipe	Own	chain	Own	Ross
Garford 68	5	5,000	36x5	40x6d	Wis.	4-4½x5½	Eise.	West.	Duplx.	Ray.	B-Lipe	Fuller	chain	Own	Ross
Garford 69	6	5,000	36x5	40x7d	Wis.	4-5 ⅛x5 ½	Eise.	.....	McCan.	Master	Fuller	Fuller	worm	Timkn.	Ross
Gary F	1	2,100	36x3½	36x4	Buda	4-3½x5	Eise.	.....	McCan.	Master	Fuller	Fuller	worm	Timkn.	Ross
Gary GT	1½	2,550	36x3½	36x5	Buda	4-4x5½	Eise.	.....	McCan.	Master	B-Lipe	B-Lipe	worm	Timkn.	Ross
Gary J	2½	2,950	36x4	36x7	Buda	4-4½x5½	Eise.	.....	McCan.	Master	B-Lipe	B-Lipe	worm	Timkn.	Ross
Gary KT	3½	3,950	36x5	40x5d	Buda	4-4½x6	Eise.	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Own	Ross
Gary M	5	5,050	36x6	40x6d	Buda	4-5x6½	Bosch	.....	Mon.	Strom.	B.&B.	Cotta	worm	Own	Ross
Gersix M	1½	2,850	36x3½	36x6	Buda	4-4x5½	Bosch	.....	Mon.	Strom.	B.&B.	Cotta	worm	Own	Ross
Gersix K	2½	3,350	36x4	36x7	Buda	4-4½x5½	Bosch	.....	Mon.	Strom.	B.&B.	Cotta	worm	Own	Ross
Gersix L	3½	4,350	36x5	40x5d	Buda	4-4½x6	Eise.	.....	.....	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Jacx.
Giant 15	1	1,950	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Jacx.
Giant 14	1½	2,375	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Ross
Giant 16	2	2,850	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Jacx.
Giant 17	3½	3,850	36x5	36x5d	Cont.	4-3½x5	Eise.	.....	Mon.	Marvel	Own	Own	bevel	.....	.....
G. M. C. 16	¾	.....	35x5*	35x5*	Cont.	4-3½x5	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
G. M. C. 31	1½	.....	36x3½	36x5	Cont.	4-3½x5	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
G. M. C. 41	2	.....	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
G. M. C. 71	3½	.....	36x5	40x5d	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
G. M. C. 101	5	.....	36x6	40x6d	Cont.	4-4½x5½	Eise.	.....	Mon.	Strom.	Own	Own	worm	Torbn.	Lavn.
Graham A	1½	2,295	35x5	36x6	Cont.	4-3½x4	.....	.....	.....	.....	.....	.....	bevel	.....	.....
Gramm-Bernstein 15	1½	.....	36x3½	36x5	Cont.	4-3½x5	N. E.	N. E.	.....	Strom.	Fuller	Fuller	in-g.	Clark	Ross
Gramm-Bernstein 65	1½	.....	36x3½	36x5	Cont.	4-3½x5	N. E.	N. E.	.....	Strom.	Fuller	Own	worm	Stan-P	Ross

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Lecce Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Dulepx; Cont., Continental; Mon., Monarch; Simplx, Simplex; McCan., McCanna; Rugles, Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespear; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe Brown-Line; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B.Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn, Torbenson; Key-H., Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chcgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn. Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Briscoe T-34	1	.....	33x4*	34x4	Own	4–3½x5	Conn.	none	Own	Buick	Own	Own	in-g.	Russel	Lavn.
Brockway S-2	1½	2,250	36x3½	36x5	Cont.	4–3½x5	Eise.	none	none	Strom.	B-Lipe	B-Lipe	worm	Shel.	Gem.
Brockway K-4	2½	3,200	36x4	36x7	Cont.	4–4½x5½	Eise.	none	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Brockway R-2	3½	4,100	36x5	36x5d	Cont.	4–4½x5½	Eise.	none	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Brockway T	5	5,250	36x6	40x6d	Cont.	4–4½x6	Eise.	.....	Duplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Champion	...	1,000	32x4	32x4	Light	4–3½x4½	A-K	.....	none	.....	.....	.....	bevel	.....	.....
Chevrolet T	1	1,325	33x4	35x5*	Own	4–3 11/16x5½	Remy	A-L*	Mon.	Zenith	Own	Warner	worm	.....	Warn.
Clydesdale	1	.....	34x3½	34x5	Cont.	4–3½x5	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	S.P.	Ross
Clydesdale 42	1½	2,445	36x3½	36x6	Cont.	4–3½x5	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Clydesdale 65X	2½	3,200	36x4	36x8	Cont.	4–4½x5½	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Clydesdale 90	3½	4,075	36x5	40x10	Cont.	4–4½x6	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Clydesdale 120B	5	5,025	36x6	40x12	Cont.	4–4½x5½	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Collier 18	1	.....	34x4	34x5	Cont.	4–3½x5	Eise.	.....	Own	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Collier 19	1½	.....	36x6	36x6	Cont.	4–3½x5	Eise.	.....	Mon.	Zenith	Fuller	Fuller	worm	Chcgo.	Ross
Collier 20	2	.....	36x4	36x7	Cont.	4–4½x5½	Eise.	.....	Mon.	Zenith	Fuller	Fuller	worm	Chcgo.	Ross
Columbia F	1	1,750	34x3½	34x4	Cont.	4–3½x5	Eise.	.....	Mon.	Zenith	Fuller	Fuller	worm	Chcgo.	Ross
Columbia H	1½	2,200	34x3½	34x5	Hink.	4–3½x5½	Dixie	.....	Pierce	Shake.	B.&B.	Covert	in-g.	Russel	Ross
Columbia G	2½	2,750	36x4	36x7	Hink.	4–4 x5½	Bosch	.....	Hink.	Strom.	Det.	Covert	in-g.	Russel	Own
Comet	1½	1,950	34x4	34x4	Lyc.	4–3½x5	Bosch	Remy	Hink.	Strom.	Det.	Covert	in-g.	Russel	.....
Commerce E	1	1,690	34x3	34x4	Cont.	4–3½x5	Delco.	Dneto.	.....	Carter	B.&B.	Muncie	worm	Chcgo.	C.A.S
Commerce EP	2	2,065	36x6	36x6	Cont.	4–3½x5	Eise.	Bijur*	none	Zenith *	Det.	Det.	in-g.	Torbn.	Jacox
Concord A	1½	2,350	36x3½	36x5	Buda	4–3½x5½	Eise.	Bijur*	none	Zenith *	Det.	Det.	in-g.	Torbn.	Jacox
Concord B	2½	2,850	36x4	36x4d	Buda	4–4½x5½	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Conestoga 12	¾	.....	32x4½	32x4½	Cont.	4–3½x5	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Conestoga 20	1	2,100	34x3½	34x5	Cont.	4–3½x5	Simms	.....	.....	Strom.	B.&B.	Muncie	in-g.	Torbn.	C.A.S.
Conestoga 30	2	2,700	36x4	36x4d	Cont.	4–3½x5	Simms	.....	.....	Strom.	Fuller	Fuller	worm	Wis.	Ross
Corbitt E	1	2,200	34x3½	34x4	Cont.	4–3½x5	Simms	.....	Dplx.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Corbitt D	1½	2,600	36x3½	36x5	Cont.	4–3½x5	Eise.	Disco*	Simplx.	Strom.	Fuller	Fuller	worm	Shel.	Ross
Corbitt C	2	3,250	...x4	36x7	Cont.	4–4½x5½	Eise.	Disco*	Simplx.	Strom.	Fuller	Fuller	worm	Shel.	Ross
Corbitt B	2½	3,500	36x4	36x7	Cont.	4–4½x5½	Eise.	none	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Corbitt A	3½	4,200	36x5	36x5d	Cont.	4–4½x5½	Eise.	none	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Corbitt AA	5	5,000	36x6	40x6d	Cont.	4–4½x6	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Dart H	1	2,100	34x3½	34x5	Buda	4–3½x5½	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Dart S	1½	2,250	34x3½	34x6	Buda	4–3½x5½	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Dart M	2½	3,000	36x4	36x7	Buda	4–4½x5½	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Dart W	3½	4,000	36x5	36x10	Buda	4–4½x6	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Day-Elder A	1	1,995	34x3	34x4	Cont.	4–3½x5	Eise.	.....	.....	Zenith	Fuller	Fuller	worm	Own	Ross
Day-Elder B	1½	2,300	34x3½	34x5	Cont.	4–3½x5	Eise.	.....	.....	Zenith	Covert	Covert	worm	Shel.	Gem.
Day-Elder D	2	2,750	36x4	36x7	Cont.	4–4½x5½	Eise.	.....	.....	Zenith	Covert	Covert	worm	Shel.	Gem.
Day-Elder C	2½	2,950	36x4	36x7	Buda	4–4½x5½	Eise.	.....	Mon.	Zenith	Covert	Covert	worm	Shel.	Gem.
Day-Elder F	3½	3,700	36x5	36x5d	Cont.	4–4½x5½	Eise.	.....	Mon.	Zenith	Covert	Covert	worm	Shel.	Gem.
Day-Elder E	5	4,600	36x5	40x6d	Buda	4–4½x6	Eise.	.....	Mon.	Zenith	Covert	Covert	worm	Shel.	Gem.
Dearborn, F	1½	1,980	34x4*	34x5	Cont.	4–3½x5	Bosch	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Dearborn, 48	2	2,390	34x4½	34x7	Buda	4–3½x5½	Bosch	.....	.....	Strom.	Fuller	Fuller	worm	Shel.	Gem.
Defiance, D	1½	2,450	35x5	36x6	Cont.	4–3½x5	Eise.	.....	.....	Strom.	Fuller	Fuller	worm	Stand.	Lavn.
Defiance, E	2	2,650	35x5	38x7	Cont.	4–3½x5	Eise.	.....	none	Strom.	B.&B.	G-Lees	worm	Stand.	Det.
DeKalb, E-2	2	2,100	34x3½	36x5	Cont.	4–4½x5½	Eise.	.....	none	Strom.	B.&B.	G-Lees	in-g.	Torbn.	Own
DeKalb, E-2½	2½	2,600	36x4	36x6	Cont.	4–4½x5½	Eise.	none	none	Master	Fuller	Fuller	in-g.	Torbn.	Own
Denby, 12	1	1,950	35x5	36x6	Cont.	4–3½x5	Eise.	none	none	Master	Fuller	Fuller	worm	Timkn.	Ross
Denby, 134	2	2,450	36x3½	36x6	Cont.	4–3½x5	Eise.	none	Mon.	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Denby, 25	3	3,250	36x4	36x7	Cont.	4–4½x5½	Eise.	none	Mon.	Strom.	Fuller	Fuller	in g.	Russel	Ross
Denby, 27	4	4,150	36x5	36x10	Cont.	4–4½x5½	Eise.	none	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Gem.
Denby, 210	5	4,900	36x6	40x12	Cont.	4–4½x5½	Eise.	.....	Simplx.	Strom.	Own	Warner	in-g.	Russel	Gem.
Dependable	1½	2,150	34x3½	34x5	Buda	4–3½x5½	Eise.	Simp.	none	Simp.	Strom.	Warner	in-g.	Clark	Ross
Dependable	2½	2,750	36x4	36x7	Buda	4–3½x5½	Dixie	.....	Pierce	Strom.	Fuller	Fuller	worm	Wis.	Ross
Diamond-T, FS	1½	2,675	36x3½	36x5	.....	4–3½x5½	Dixie	.....	Pierce	Zenith	Fuller	Fuller	worm	Wis.	Ross
Diamond, T, U	2	3,285	36x4	36x7	.....	4–4 x5½	Bosch	.....	.....	Strom.	.....	.....	worm	Wis.	Gem.
Diamond, T, LB	3½	4,390	36x5	36x5d	Cont.	4–4½x5½	Bosch	.....	.....	Strom.	.....	.....	worm	Timkn.	Gem.
Diamond-T, S	5	5,785	36x6	40x6d	.....	4–4½x6	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	.....	.....
Diehl, A	1	1,575	34x4½	35x5	Cont.	4–3½x5	Bosch	Presto	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Doane	2	3,750	36x5	36x7	Wauk.	4–4½x5½	Bosch	none	Zenith	B.&B.	Durstn.	in-g.	Torbn.	Jacox.	Own
Doane	6	5,825	36x6	40x6d	Wauk.	4–4½x6½	Bosch	.....	.....	Master	B-Lipe	Chain	Own	Own	Own
Dodge	¾	.....	32x3½	32x3½	Own	4–3½x4½	Own	none	Wauk.	Master	B-Lipe	.....	Chain	Own	Lavn.
Dorris, K4	2	3,285	36x4	36x7	Own	4–4½x5½	Bosch	N.E.	none	Stew.	Own	Own	.....	Own	Own
Dorris, K7	3	4,200	36x5	36x10	Own	4–4½x5½	Bosch	West.*	Own	Strom.	W.G.Co	W.G.Co	worm	Timkn.	Ross
Douglas C	1	1,790	34x4½	35x5	Buda	4–3½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	in-g.	Torbn.	Ross
Douglas D	1½	2,175	35x5	36x6	Buda	4–4½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	in-g.	Torbn.	Ross
Douglas E	2½	2,750	36x6	40x8	Buda	4–4½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	in-g.	Torbn.	Ross
Douglas F	2½	3,025	36x6	40x8	Buda	4–4½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	worm	Wis.	Ross
Gramm-Bernstein 20	2	.....	36x4	36x7	Cont.	4–4½x5½	N. E.	N. E.	.....	Strom.	Fuller	Own	worm	Shel.	Ross
Gramm-Bernstein 25	2½	.....	36x4	36x4d	Hink.	4–4½x5½	Eise.	N. E.	.....	Strom.	Own	Own	worm	Stan-P	Ross
Gramm-Bernstein 35	3½	.....	36x5	40x5d	Hink.	4–4½x5½	Eise.	N. E.	.....	Strom.	Own	Own	worm	Stan-P	Ross
Gramm-Bernstein 50	5	.....	36x6	40x6d	Cont.	4–4½x6	Eise.	N. E.	Hink.	Strom.	Own	Own	worm	Stan-P	Ross
Grant 10	1½	1,885	34x4½*	34x5	Cont.	4–3½x5	Split.	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g.	Torbn.	Jacx.
Grant 11	1½	1,935	34x4½*	34x5	Cont.	4–3½x5	Split.	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g.	Torbn.	Jacx.
Grant 17	1½	2,600	35x5	38x7	Cont.	4–3½x5	Split.	Remy*	Pierce	Car.*	B-Lipe	B-Lipe	in-g.	Torbn.	Jacx.
Grant 15	2	2,150	34x4	34x6	Cont	4–3½x5	Split	Remy*	Pierce	Car *	B &B	G-Lees	in-g	Torbn	Jacx
Grant 16	2	2,250	34x4	34x6	Cont	4–3½x5	Split	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g.	Torbn.	Jacx.
Hahn J-4	1	.....	36x3½	36x5	Cont.	4–3½x5	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Shel.	Ross
Hahn CD	1½	.....	36x3½	36x6	Cont.	4–4½x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn DE	2	.....	36x4	36x7	Cont.	4–4½x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn EE	2½	.....	36x4	36x8	Cont.	4–4½x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn F	3½	.....	36x5	36x10	Cont	4–4½x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn FE	5	.....	36x6	40x12	Cont.	4–4½x6	Opt.	.....	Pierce	Opt	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hal-Fur D	1	2,000	35x5	35x5	Hink.	4–4x5½	Bosch	West.	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Hal-Fur B	2½	2,750	35x5	36x7	Hink.	4–4½x5½	Bosch	none	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Hall	2	2,875	36x4	36x4d	Cont.	4–4½x5½	Bosch	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Hall	3½	3,750	36x5	36x5d	Cont.	4–4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Hall	5	4,850	36x5	40x6d	Cont.	4–4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Hall	7	4,850	36x5	40x6d	Cont.	4–4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Harvey WEA	1½	2,550	34x3½	34x5	Buda	4–4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	chain	Timkn.	Gem.
Harvey WFA	2½	3,300	36x4	36x7	Buda	4–4½x5½	Bosch	.....	Mon.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Harvey WHA	3½	4,300	36x5	36x5d	Buda	4–4½x5½	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Harvey WKA	5	5,200	36x6	40x6d	Buda	4–4½x6	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Hawkeye K	1½	1,995	34x3½	34x5	Buda	4–3½x5½	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Hawkeye M	2	2,650	36x4	36x6	Buda	4–4½x5½	Eise.	.....	Simplx.	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Hendrickson	2½	3,200	36x4	36x7	Buda	4–4½x5½	Eise.	West.	Simplx.	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Hendrickson	3½	4,000	36x5	36x5d	Buda	4–4½x5½	.....	.....	.....	Strom.	Fuller	.....	worm	Timkn.	Ross
Hendrickson	5	5,250	36x6	40x6d	.....	4–5x6	.....	.....	.....	Strom.	Fuller	.....	worm	Timkn.	Ross
Highway Kn't A	4	5,000	36x5	36x6	Knight	4–4x6	Eise.	Wag.	Mon.	Zenith	.....	.....	worm	Timkn.	Ross
Highway Kn't	5	5,800	36x5	40x6d	Knight	4–4x6	Eise.	Wag.	Mon.	Zenith	.....	.....	worm	Shel.	Ross
Huffman C	1½	1,695	34x3½	34x6	Buda	4–3½x5	Dixie	.....	.....	Zenith	Fuller	Fuller	worm	Shel.	Ross
Huffman B	1½	1,895	34x3½	34x6	Cont.	4–3½x5	Dixie	.....	.....	Zenith	Fuller	Fuller	worm	Torbn.	Lavn.
Hurlburt A	1½	2,850	34x4	34x5	Buda	4–4½x5½	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Chgo.	Lavn.
Hurlburt B	2½	3,750	36x4	36x4d	Buda	4–4½x5½	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
Hurlburt C	3½	4,400	36x5	36x5d	Buda	4–4½x6	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
Hurlburt D	5½	5,250	36x5	40x6	Buda	4–4½x6	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
Independent F	1–2	.....	36x3½	36x5	Cont.	4–3½x5	Eise.	.....	Pierce	Scheb.	Fuller	Fuller	worm	Wis.	Ross
Indiana 12	1½	.....	34x3½	34x5	Wauk.	4–3½x5½	Eise.	West.	Wauk.	Strom.	B.&B.	Covert	worm	Shel.	Wol.
Indiana 20	2	.....	36x4	36x7	Ruten.	4–4½x5½	Eise.	West.	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Indiana 25	2½	.....	36x4	36x8	.....	4–4½x5½	.....	.....	.....	.....	.....	.....	worm	.....	.....
Indiana 35	3½	.....	36x5	36x5d	Ruten.	4–4½x5½	Eise.	West	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Indiana 50	5	.....	36x5	40x6d	Wauk.	4–4½x6½	Eise.	West.	Wauk.	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
International H	¾	1,750	36x3½	36x3½	Wauk.	4–3½x5½	Bosch	N. E.*	Own	Ens.	Own	Own	in-g.	Own	Own
International F	1	1,950	36x3½	36x4	Own	4–3½x5½	Bosch	N. E.*	Own	Ens.	Own	Own	in-g.	Own	Own
International K	1½	2,300	36x3½	36x5	Own	4–3½x5½	Bosch	N. E.*	Own	Ens.	Own	Own	in-g.	Own	Own
International G	2	2,700	36x4	36x6	Own	4–4½x5	Split.	N. E.*	Own	Ens.*	Own	Own	in-g.	Own	Own
International L	3½	4,500	36x5	40x10	Own	4–4½x5	Split.	N. E.*	Own	Ens.*	Own	B-Lipe	in-g.	Own	Own
Jackson C	3½	4,250	36x7	36x7	Cont.	4–4½x5½	Eise.	Eise.	Pierce	Strom.	B.&B.	Own	bevel	Own	Ross
Jumbo 15	1½	2,595	36x3½	36x5	Buda	4–3½x5½	N. E.	N. E.	none	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo 20	2	2,795	35x5	38x7	Buda	4–3½x5½	N. E.	N. E.	none	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo 25	2½	3,095	36x4	36x7	Buda	4–4½x5½	Eise.	Eise.	Duplx.	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo 30	3	3,590	36x6	42x9	Buda	4–4½x5½	Eise.	Eise.	Duplx.	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo 35	3½	4,300	36x5	36x10	Buda	4–4½x6	Eise.	Eise.	Simplx.	Zenith	B-Lipe	B-Lipe	in-g.	Clark	Jacx.
Jumbo 40	4	4,875	38x7	44x10	Buda	4–4½x6	Eise.	Eise.	Simplx.	Zenith	B-Lipe	B-Lipe	in-g.	Clark	Jacx.
Kalamazoo G	1½	.....	34x4	34x5	Cont.	4–3½x5	Bosch	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	Wis.	Ross
Kalamazoo H	2½	.....	34x5	36x7	Wis.	4–4x6	Bosch	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Ross
Kalamazoo K	3½	.....	36x5	36x5d	Wis.	4–4½x6	Bosch	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Ross
Kankakee E	2½	2,875	34x4	36x6	Cont.	6–3½x5½	Delco	Delco	.....	Zenith	Warner	Warner	in-g.	Russel	Ross

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc.,Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Leece Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx, Simplex; McCan., McCanna; Rugles, Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B.Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn, Torbenson; Key-H., Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury Ind., Industrial; Chgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Motor Age Monthly Guide to Truck Specifications—Continued

These tables are revised and brought up to date monthly

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Kearns	½	1,550	32x4½	32x4½	Light	4-3½x4½	Berl.	Dyn.	Mon.	Zenith	B.&B.	G-L	in-g.	Torbn.	Lavn.
Kearns	1½	2,100	34x5½	34x6	H-S	4-3½x5	Berl.	none	Pierce	Zenith	B.&B.	G-L	in-g.	Torbn.	Lavn.
Keldon, 19	2	2,885	36x4	36x7	Buda	4-4½x5½	Eise.	none	Pierce	Strom.	Fuller	Fuller	in-g.	Russel	Ross
Kelly-S, K-31	1½	3,000	36x3½	36x6	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	Chain	Own	Gem.
Kelly-S, K-32	1½	3,000	36x3½	36x6	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	worm	Own	Gem.
Kelly-S, K-35	2½	3,500	36x4	36x6	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	Chain	Own	Gem.
Kelly-S, K-36	2½	3,500	36x4	36x4d	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	worm	Own	Gem.
Kelly-S, K-40	3½	4,400	36x4	40x5d	Own	4-4½x6½	Eise.	opt.*	Pierce	Ray.	Own	Covert	Chain	Own	Gem.
Kelly-S, K-45	4	4,500	36x5	40x6d	Own	4-4½x6½	Eise.	opt.*	Pierce	Ray.	Own	Covert	Chain	Own	Gem.
Kelly-S, K-50	5	5,150	36x6	40x6d	Own	4-4½x6½	Eise.	opt.*	Pierce	Ray.	Own	Covert	Chain	Own	Gem.
Kelly-S, K-60	6	5,500	36x6	40x7d	Own	4-4½x6½	Eise.	opt.*	Pierce	Tillot.	Own	Own	in-g.	Torbn.	Own
Keystone	1	1,375	31x4*	33x5*	Own	4-3¾x4	A-L	.....	.....	Pierce	Zenith	Fuller	in-g.	Russel	Ross
Keystone	2	2,100	35x5*	38x7*	Buda	4-3½x5½	Berl.	none	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Kimball, B	2	3,675	36x4	36x7	Wis.	4-4½x6	Eise.	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Kimball, C	2½	3,975	36x4	36x7	Wis.	4-4½x6	Eise.	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Kimball, K	3	4,400	36x4	36x8	Wis.	4-4½x5½	Berl.	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Kimball, E	4	5,000	36x5	40x10	Wis.	4-5x5½	Berl.	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Kimball, F	5	5,975	36x6	40x12	Wis.	4-5½x6	Berl.	.....	Pierce	Strom.	W.G.Co	W.G.Co	.....	Own	Jacx.
Kissel	½	1,875	24x4½*	34x4½	Own	4-3¾x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Shel.	Jacx.
Kissel	1½	2,975	36x5½	36x5	Own	4-3½x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Timkn.	Lavn.
Kissel	2	2,975	36x4	36x7	Own	4-4½x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Shel.	Ross
Kissel	3½	3,975	36x5	36x5d	Own	4-4½x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Shel.	Ross
Kissel	5	4,785	36x6	36x6d	Own	4-4x5	.....	.....	Duplx.	Zenith	.....	B-Lipe	worm	Timkn.	Ross
Kimball, A	1½	3,075	36x3½	36x5	Wis.	4-3½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Kleiber, AA	1	.....	34x3½	34x5	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Timkn.	Ross
Kleiber, A	1½	.....	36x3½	36x6	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Shel.	Ross
Kleiber, AB	2	.....	36x4	36x3½d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Timkn.	Ross
Kleiber, B	2½	.....	36x5	36x4d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	Own	Own	Chain	Own	Ross
Kleiber, C	3½	.....	36x5	36x5d	Cont.	4-4½x5½	Berl.	G.&D.	None	Zenith	Own	Own	Chain	Own	Ross
Knox, 35-Tractor	5	6,000	36x4	38x6d	Own	4-5 x5½	Berl.	G.&D.	None	Zenith	Own	Own	in-g.	Torbn.	Own
Knox, 36-Tractor	10	6,500	36x4	38x6d	Own	4-5 x5½	Berl.	G.&D.	None	Zenith	Mech.	Mech.	in-g.	Torbn.	Own
Koehler, C	1½	1,985	34x3	34x5	H-S	4-3½x5	Eise.	none	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Koehler, M	2½	3,365	36x4	36x7	Herc.	4-4 x5½	Eise.	none	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Koehler Trac., MT	5	3,450	36x4	36x7	Herc.	4-4 x5½	Eise.	none	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
									Simplx.	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, U	1½	2,250	34x3½	34x5	Cont.	4-3½x5	Bosch	.....	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, EK&SK	2½	3,250	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, EL &SL	3½	4,000	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, SW&EW	5	4,900	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Simplx.	Strom.	B.&B.	.....	in-g.	Russel	.....
L. M. C	2½	2,950	36x4	36x4d	Cont.	6-5½x7	Simms	.....	Pierce	Strom.	.....	.....	worm	.....	.....
Lombard	7	.....	.....	.....	.....	.....	.....	.....	Own	Scheb.	.....	.....	.....	.....	.....
											Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, S	1	2,400	34x3½	34x4	Cont.	4-3½x5	Eise.	none	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, L	1½	2,925	36x4	36x5	Cont.	4-4½x5½	Eise.	none	Pierce	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, H	2½	3,500	36x4d	36x4	Cont.	4-4½x5½	Eise.	none	Pierce	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, M	3½	4,300	36x5	36x5d	Wis.	4-4½x6	Eise.	none	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, G	5½	5,250	36x5	40x6d	Wis.	4-5 x6	Eise.	none	Pierce	Zenith	B-Lipe	B-Lipe	Chain	Own	Gem.
Mack, AB	1½	3,000	36x4	36x3½d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	Chain	Own	Gem.
Mack, AB	1½	3,000	36x4	36x3½d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Cwn	Gem.
Mack, AB	2	3,300	36x4	36x4d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	Chain	Own	Gem.
Mack, AB	2	3,300	36x4	36x4d	Own	4-4 x5	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack, AB	2	3,300	36x4	36x4d	Own	4-4 x5	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack Trac., AB	5	3,400	36x4	36x4d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack, AC	3½	4,950	36x5	40x5d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack, AC	5	5,500	36x5	40x6d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	chain	Own	Gem.
Mack, AC	6½	5,750	36x6	40x6d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	chain	Own	Gem.
Mack Trac., AC	7	4,950	36x5	40x7d	Own	4-5x6	Dixie	.....	Own	Zenith	Own	Own	chain	Own	Gem.
Mack AC	7½	6,000	36x7	40x7d	Own	4-5x6	Dixie	.....	Own	Zenith	Own	Own	chain	Own	Gem
Mack Trac. AC	10	5,500	36x6	40x6d	Own	4-5x6	Aero	.....	Own	Zenith	Own	Own	chain	Own	Ross
Mack Trac. AC	13	5,750	36x6	40x12s	Own	4-5x6	Dixie	.....	Own	Zenith	Own	Own	in-g.	Timkn.	Ross
Mack Trac. AC	15	6,000	36x7	40x7d	Own	4-5x6	Dixie	.....	Own	Zenith	Own	Fuller	worm	Timkn.	Ross
Master JI	1½	2,390	34x3½	34x5	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	Fuller	Fuller	worm	Timkn.	Ross
Master JW	1½	2,490	34x3½	34x5	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master WL	2	3,190	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Timkn.	Ross
Master M	2½	2,790	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Timkn.	Ross
Master O	2½	2,890	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Timkn.	Ross
Paige, 51-18	3½	4,150	36x5	36x5d	Cont.	4-4½x5½	Bosch	none	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Jacx.
Parker, P20	2	3,500	34x4	36x4d	Wis.	4-4x6	Bosch	West.	Mon.	Strom.	B-Lipe	Fuller	worm	Own	Ross
Parker, J20	3½	4,400	36x5	40x5d	Wis.	4-4½x6	Bosch	West.	Mon.	Strom.	B-Lipe	Warner	worm	Own	Ross
Parker, M20	5	5,500	36x6	40x6d	Wis.	4-4½x6	Bosch	West.	Simplx.	Strom.	B-Lipe	Warner	worm	Cwn	Ross
Patriot, Fevere	¾	1,890	35x5*	35x5*	Cont.	4-3½x5	A-K	Bijur	.....	Strom.	B. & B.	Covert	worm	Empire	.....
Patriot, Lincoln	1½	2,650	34x3½	34x3½d	Eink.	4-4½x5½	Split	.....	Hink.	Strom.	Covert	Fuller	worm	Empire	Ross
Patriot, Wash	2½	3,650	36x4	36x3½d	Eink.	4-4½x5½	.....	.....	Hink.	Strom.	Covert	Covert	worm	Empire	Ross
Pierce-Arrow, X4	2	4,300	36x4	36x4d	Cwn	4-4½x5½	Dixie	Vesta	Own	Own	Own	Own	worm	Own	Own
Pierce-Arrow, R9	5	5,500	36x5	40x6d	Cwn	4-4½x6	Dixie	Vesta	Own	Own	Own	Own	worm	Own	Own
Pioneer All Steel, F	2	2,790	36x4	36x7	Cont.	4-4½x5½	Eise.	None	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Pony	¼	320	28x3	28x3	Own	4-2½x4	A-K	opt.	opt.	.....	.....	.....	chain	Own	Own
Power, B	2	2,950	36x4	36x4d	Cont.	4-4½x5½	Simms	None	Pierce	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Ranier, R-11	¾	1,850	34x4½	34x4½	Cont.	4-3½x5½	Simms	opt.	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Ranier, R-9	1	2,050	32x3	32x4	Cont.	4-3½x5	Simms	opt.	Mon.	Zenith	B-Lipe	B-Lipe	worm	Sl.el.	Lavn.
Ranier, R-6	1½	2,150	34x3	34x3	Cont.	4-3½x5½	Simms	opt.	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Ranier, R-8	2	2,650	34x4	34x6	Cont.	4-4x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	ext-g	Badger	Ross
Reliance, A-10	1½	2,500	36x3½	36x5	Buda	4-4½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Cotta	ext-g	Badger	Ross
Reliance, B-20	2½	3,200	36x4	36x6d	Buda	4-4½x5½	Remy	Remy	none	John.	Own	Own	bevel	Own	Cwn
Reo, F	1¼	1,385	34x4½	34x4½	Own	4-4½x4½	Eise.	none	Rugles	Strom.	Fuller	Fuller	in-g	Torbn.	Jacx.
	1	.....	34x3	34x3	Cont.	4-3½x5	Eise.	none	Rugles	Strom.	Fuller	Fuller	in-g	Torbn.	Jacx.
Republic, 10	1½	2,050	34x3½	34x5	Cont.	4-3½x5	Eise.	none	Pharo	Strom.	Fuller	Fuller	in-g	Torbn.	Jacx.
Republic, 11X	2½	2,595	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Pharo	Strom.	Own	Own	worm	Own	Cwn
Republic, 19	3½	3,795	36x5	36x10	Cwn	4-4x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Own	Own
Republic, 20	1½	2,650	36x3½	36x6	Cwn	4-4½x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Own	Own
Reynolds	2½	3,350	36x4	36x8	Own	4-4½x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Cwn	Ross
Reynolds	3½	4,350	36x5	36x5	Own	4-4½x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Cwn	Ross
Reynolds	5	5,350	36x6	36x6d	Cwn	4-4½x6	Berl.	West.	Own	B. & B.	Own	Own	worm	Cwn	Ross
Reynolds	3	4,600	36x5	36x5d	Cwn	4-4½x6	Berl.	West.	Own	B. & B.	Own	Own	worm	Shel.	Ross
Riker, B	4	4,700	36x5	36x6	Own	4-4x5	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Riker, BB	2	3,300	34x4	36x3½	Wis.	4-4x5	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	wcrm	Shel.	Ross
Rowe, CDW	2½	3,575	34x4	36x4d	Wis.	4-4x5	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, CDW	2½	2,800	36x6*	36x6*	Wis.	4-3½x5	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, CW	1½	3,900	36x5	36x5d	Wis.	4x5	.....	.....	.....	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, GSW	3	4,950	38x7	42x9	H-S	3½x5	A-K	West.	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, GPW	3	4,350	36x5	36x6d	Wis.	4½x6	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, HW	4	5,390	36x6	40x6d	Wis.	4½x6	Bosch	.....	.....	.....	.....	.....	.....	.....	.....
Rowe, FW	5	.....	.....	.....	.....	.....	.....	.....	.....	Strom.*	Fuller	Fuller	worm	Shel.	Ross
										Strom.*	Fuller	Fuller	worm	Shel.	Ross
Sandow, G	1	2,095	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sandow, CG	1½	2,390	34x3	34x5	Cont.	4-3½x5	Eise.	.....	Mon.	Strom.	B-Lipe	Fuller	worm	Torbn.	Ross
Sandow, J	2	3,175	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	.....	Strom.	B-Lipe	B-Lipe	in-g	Timkn.	Ross
Sandow, I	2½	2,575	36x4	36x6	Cont.	4-3½x5	Eise.	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sandow, K	3½	4,195	36x5	36x5d	Cont.	4-4½x5	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sandow, M	5	4,975	36x6	40x6d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B. & B.	B-Lipe	worm	Shel.	Ross
Sanford, W-25	2½	3,290	36x4	36x4d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B. & B.	B-Lipe	worm	Shel.	Ross
Sanford, W-35	3½	4,050	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Pierce	Scheb.	Lart.	Own	worm	Own	Own
Sanford, W-50	5	4,950	36x5	40x6d	Cont.	4-4 x5½	Bosch	none	Duplx.	Scheb.	Cwn	Own	worm	Own	Own
Schacht	2	.....	36x4	36x7	Buda	4-4½x5½	Bosch	none	Duplx.	Scheb.	Own	Own	worm	Own	Own
Schacht	2½	.....	36x4	36x4d	Buda	4-4½x6	Bosch	none	Duplx.	Scheb.	Own	Own	worm	Own	Own
Schacht	3½	.....	36x5	36x5d	Buda	4-4½x6	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	in-g	Torbn.	Ross
Schacht	5	.....	36x5	40x6d	Buda	4-4½x6	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	in-g	Torbn.	Ross
Schwartz, B	1½	2,175	34x2½	30x3½3	Cont.	4-3½x5	Bosch	none	Duplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn
Schwartz, C	2½	2,675	36x4	34x5	Cont.	4-4½x5½	Bosch	Fijur	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Schwartz, D	5	4,500	36x6	36x6d	Buda	4-4½x6	Bosch	N. E.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Selden	1½	2,460	24x2½	35x5	Cont.	4-3½x5	Eise.	N. E.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Selden	2½	3,550	36x4	36x7	Cont.	4-4½x5½	Eise.	N. E.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Selden	3½	4,325	36x5	36x10	Cont.	4-4½x5½	Eise.	.....	Conn.	Strom.	Det.	B-Lipe	worm	Timkn.	Gem.
Selden	5	5,770	36x6	40x12	Cont.	4-4½x6	Conn.	A-Ch.	.....	Scheb.	B. & B.	Warren	bevel	Peru	Ditw.
Selden	¼	.....	30x3½3	0x3½	LeR.	4-3½x4½	Eise.	West.*	none	Strom.*	Fuller	Fuller	worm	Timkn.	Ross
Seneca, L	1	2,460	24x2½	34x5	Buda	4-3½x5½	Eise.	West.*	Duplx.	Strom.*	B. & B.	B-Lipe	worm	Timkn.	Ross
Service, LLO	1½	2,985	36x3½	36x6	Buda	4-4x5½	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Service, 31	1½	3,415	35x5*	28x7*	Buda	4-4½x5½	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Service, 36	2½	3,475	36x4	36x7	Buda	4-4½x5½	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Service, 51	3½	4,285	36x5	36x5d	Buda	4-4½x5½	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Service, 71	3½	4,485	36x5	36x5d	Buda	4-4½x6	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Service, 76															

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Leece Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx, Simplex; McCan., McCanna; Rugles, Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Ravfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Meeh., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B.Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H., Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury, Ind., Industrial; Chcgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Master W	2½	3,000	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master A	3½	4,190	36x5	40x5d	Buda	4-4½x6	Eise.	opt.	Pierce	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master B	5	5,290	36x6	40x6d	Buda	4-4½x6½	Eise.	opt.	Pierce	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master Trac. T	6	3,050	34x4	36x4d	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Torbn.	Ross
Maxwell	1½	1,322	32x3	32x4	Own	4-3⅞x4½	A-K	A-L	Own	Spec.	Own	Own	worm	Own	Own
Menominee Hurrytown	1	2,080	34x3½	36x5	Wis.	4-3⅞x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Menominee H	1½	2,725	36x3½	36x5	Wis.	4-4x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Menominee D	2	3,245	36x4	36x4d	Wis.	4-4x6	Eise.	.....	Mon.	Strom.	B. & B.	Cotta	worm	Timkn.	Ross
Menominee J	3½	4,270	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Mon.	Strom.	B. & B.	Cotta	worm	Timkn.	Ross
Menominee G	5	5,450	36x6	40x6d	Wis.	4-4½x5½	Eise.	.....	Mon.	Strom.	B. & B.	Cotta	worm	Timkn.	Ross
Menominee J	5	5,450	36x6	40x6d	Cont.	4-4½x5½	Dixie	.....	.....	Miller	Own	Own	worm	Timkn.	Ross
Moreland 19-B	1½	2,930	36x3½	36x5	Cont.	4-4½x5½	Dixie	.....	.....	Miller	Own	Own	worm	Timkn.	Ross
Moreland 19-C	2½	3,775	36x4	36x7	Cont.	4-4½x5½	Dixie	.....	Cont.	Miller	Own	Own	worm	Timkn.	Ross
Moreland 19-G	4	4,875	36x5	40x5d	Cont.	4-4½x6	Dixie	.....	Cont.	Miller	Own	Own	worm	Timkn.	Ross
Moreland 19-J	5	5,350	36x6	40x6d	Cont.	4-4½x6	Dixie	.....	Pierce	Detroit	Fuller	Fuller	in-g.	Torbn.	Lavn.
Muskegon 20	2	2,325	36x4	36x6	Cont.	4-4½x5½	Eise.	.....	Dupix.	Strom.	H-Shaw	Fuller	worm	Wis.	Ross
Mutual	2	3,450	36x4	36x8	Wis.	4-4½x6	Bosch	West.	Dupix.	Strom.	H-Shaw	Warner	worm	Wis.	Ross
Mutual	3½	.....	36x5	.....	Wis.	4-4½x5½	Bosch	West.	Dupix.	Strom.	H-Shaw	Warner	worm	Wis.	Ross
Mutual	5	.....	36x6	.....	Wis.	4-5 1x5½	Bosch	West.	Dupix.	Strom.	H-Shaw	Warner	worm	Wis.	Ross
Napoleon 9	1	1,535	32x3½	32x4	Gray	4-3½x5	Conn.	A-L	.....	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Napoleon 11	1½	1,860	34x4	34x5	Gray	4-3½x5	Conn.	A-L	.....	Strom.	Fuller	Fuller	in-g	Clark	Lavn.
Nash 2018	1	1,785	34x4	34x3	Own	4-3½x5½	Eise.	A-L	Simplx.	Strom.	B. & B.	Detroit	in-g	Clark	Jacx.
Nash 3018	2	2,395	34x4	36x6	Own	4-3½x5½	Eise.	A-L	Simplx.	Strom.	B. & B.	Detroit	in-g	Clark	Jacx.
Nash 4017	2	3,250	34x5	36x5	Buda	4-4½x5½	Eise.	none	Simplx.	Strom.	B. & B.	Own	in-g	Own	Lavn.
Nelson & LeM., F	1	2,250	36x3½	36x4	Cont.	4-4½x5½	Bosch	West.*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Nelson & LeM., F2	2	.....	36x4	36x7	Cont.	4-4½x5½	Bosch	West.*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Nels'n & LeM., F3½	3½	.....	36x5	36x5d	Cont.	4-4½x6	Bosch	West.*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
N'ls'n & LeM., FC5	5	.....	36x6	40x6d	Cont.	4-4½x6	Eise.	none	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Netco, D	2	3,100	36x4	36x6	Cont.	4-4½x5½	Eise.	none	none	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Netco, H	2½	3,500	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Pierce	Strom.	B. & B.	Covert	.....	Timkn.	Gem.
Niles	1-2	.....	36x4	36x7	Cont.	4-	Eise.	.....	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, A-20	1	.....	36x3½	36x4	Buda	4-3½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, B-30	1½	.....	36x3½	36x5	Buda	4-3½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, C 40	2	.....	36x4	36x7	Buda	4-4x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, D-50	2½	.....	36x4	36x8	Buda	4-4½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, E-70	3½	.....	36x5	36x10	Buda	4-4½x6	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Ross
Northway, B-2	2	3,250	36x4	36x4d	Cwn	4-4x6	Wag.	West.	Pierce	Scheb.	Fuller	Fuller	worm	Shel.	Ross
Northway, B-3½	3½	4,250	36x5	40x5d	Own	4-4x6	Wag.	West	Pierce	Scheb.	Fuller	Fuller	worm	Shel.	Ross
Norwalk, 2000	1	1,695	34x4*	34x4*	Lyc.	4-3½x5	Delco	Dneto.*	none	Zenith	B. & B.	G-Lees	worm	Stand.	C.A.S.
Norwalk, 3000	1½	2,025	34x4	34x5	Lyc.	4-3½x5	Delco	Dneto.*	none	Zenith	B. & B.	G-Lees	worm	Stand.	C.A.S.
O.K	1½	2,450	36x3½	36x5	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	Fuller	Fuller	worm	Wis.	Ross
O.K	2½	3,250	36x4	36x7	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	Fuller	Fuller	worm	Wis.	Ross
O.K	3½	4,150	36x5	36x5d	Buda	4-4½x6	Eise.	none	Pierce	Strom.	B. & B.	G-Lees	worm	Timkn.	Lavn.
O.K	5	4,150	36x6	36x4	Cont.	4-3½x5	Eise.	.....	Pierce	Strom.	B. & B.	G-Lees	worm	Timkn.	Lavn.
Old Hickory, W	1	2,175	36x3½	36x4	Cwn	4-3 1½x5½	A-L	A-L	.....	Zenith	Cwn	Warner	in-g.	Torbn.	Jacx.
Oldsmobile	¾	1,250	35x5*	35x5*	Own	4-3 1½x5½	A-L	A-L	.....	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Old Reliable, A	1½	1,250	35x5*	36x6	Wis.	4-4x5	Bosch	opt.	Mon.	Strom.	Fuller	Fuller	worm	Shel.	Ross
Old Reliable, B	2½	2,350	34x3½	36x4d	Wis.	4-4½x6	Bosch	opt.	Mon.	Strom.	Fuller	Fuller	worm	Shel.	Ross
Old Reliable, C	3½	3,500	36x4	36x5d	Wis.	4-4½x6	Bosch	opt.	Mon.	Strom.	Fuller	Fuller	worm	Shel.	Ross
Old Reliable, D	5	4,250	36x5	36x6d	Wis.	4-5 1x5½	Bosch	opt.	Dupix.	Strom.	Univ.	Savg.	chain	Shel.	Ross
Old Reliable, K, L & M	7½	6,250	36x6	40x7d	Wauk.	4-4½x6½	Bosch	none	Wauk.	Strom.	Univ.	Savg.	chain	Shel.	Ross
Oneida, A-9	1¼	2,350	36x6*	36x6*	Own	4-3½x5½	Bosch	West.	Own	Strom.	Own	Own	worm	Own	Ross
Oneida, B-9	1¾	2,750	36x3½	36x6	Own	4-4x5½	Bosch	West.	Own	Strom.	Own	Own	worm	Own	Ross
Oneida, C-9	2½	3,200	36x4	36x7	Own	4-4x5½	Bosch	West.	Own	Strom.	Own	Own	worm	Timkn.	Ross
Oneida, D-9	3½	4,100	36x5	36x10	Own	4-4½x5½	Bosch	West.	Own	Strom.	Own	Own	worm	Timkn.	Ross
Oneida, E-9	5	5,150	36x6	40x12	Own	4-4½x5½	Bosch	West.	Own	Strom.	Own	Own	worm	Timkn.	Ross
Oshkosh	2	3,500	36x6*	36x6*	H-S	4-3½x5	N.E.	N. E.	Duplx.	Zenith	B-Lipe	B-Lipe	bevel	Own	Own
Packard, E, Size B	...	3,200	34x3½	34x3½d	Cwn	4-4 7/8x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E, Size C	...	3,600	34x4	34x4d	Cwn	4-4 7/8x5½	Dixie	Bijur*	Cwn	Own	Own	Own	worm	Own	Own
Packard, E, Size D	...	4,350	36x5	36x5d	Cwn	4-4½x5½	Dixie	Bijur*	Cwn	Own	Own	Own	worm	Own	Own
Packard, E, Size E	...	4,550	36x5	40x5d	Cwn	4-4½x5½	Dixie	Bijur*	Cwn	Own	Own	Own	worm	Own	Own
Packard, E, Size F	...	5,450	36x6	40x6d	Own	4-5x5½	Dixie	Bijur*	Cwn	Own	Own	Own	worm	Own	Own
Packard, E, Size G	...	5,700	36x6	40x7d	Own	4-5x5½	Dixie	Bijur*	Cwn	Own	Own	Own	worm	Own	Own
Packard, E, Size V	...	4,100	36x6	38x7	.....	-4 7/8x5½	Dixie	Bijur*	Cwn	Own	Own	Own	worm	Own	Own
Packard, E, Size X	...	4,500	36x6	40x8	.....	-4 7/8x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E, Size Y	...	5,500	38x7	44x10	.....	-5x5½	Dixie	.....	Link.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	.....
Paige, 52-19	1½	2,680	34x5	38x7	Hink.	4-4x5½	Bosch	none	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Jacx.
Paige, 50-18	2½	3,150	34x4	34x4d	Cont.	4-4½x5½	Bosch	none	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Jacx.
Service, 101	5	5,275	36x6	40x6d	Buda	4-4½x6	Eise.	West.*	Duplx.	Strom.	B. & B.	B-Lipe	worm	Timkn.	Ross
Shaw, M-2	¾	1,975	32x4	32x4	Cont.	4-3½x5	Bosch	.....	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Shaw, M-4	1	2,300	34x3	34x4	Cont.	4-3½x5	Bosch	.....	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Signal, F	1	2,750	34x3½	36x5	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, H	1½	2,925	34x4	36x6	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, J	2½	3,275	24x4	36x8	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, M	3½	4,275	36x5	40x10	Cont.	4-4½x5½	Eise.	none	.....	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, R	5	5,300	36x6	40x12	Cont.	4-4½x6	Eise.	.....	Pierce	Zenith	B. & B.	.....	.....	.....	.....
Southern, A	1	1,495	34x4	34x4	Buda	4-3½x5½	Delco	.....	Pierce	Zenith	B. & B.	.....	.....	.....	.....
Southern, B	1½	1,795	24x4	34x4	Cont.	4-3½x5	Delco	.....	Pierce	Zenith	B. & B.	.....	.....	.....	.....
Standard, 56	1	2,250	24x3½	34x4	Cont.	4-3½x5	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Standard, 76	2½	3,200	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Standard, 66	3½	4,200	36x5	36x5	Cont.	4-4½x5½	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Standard, 86	5	5,000	36x6d	40x6d	Cont.	4-4½x5½	Eise.	.....	Wauk.	Ray.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Sterling	1½	2,850	36x3½	36x5	Own	4-4x5½	Eise.	.....	Wauk.	Ray.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sterling	2	3,100	36x4	36x6	Own	4x5½	Eise.	West.	Wauk.	Ray.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sterling	2½	3,475	36x4	36x4d	Own	4-4½x5½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	worm	Timkn.	Ross
Sterling	3½	4,550	36x5	40x5d	Own	4-4½x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	worm	Timkn.	Ross
Sterling, W	5	5,350	36x6	40x6d	Own	4-5x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	chain	Own	Ross
Sterling, C	5	5,600	36x6	40x5d	Own	4-5x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	chain	Own	Ross
Sterling	7½	6,000	36x6	40x7d	Own	4-5x6½	Eise.	.....	.....	Zenith	B. & B.	Durston	in-g	Clark	C.A.S.
Stewart	1	1,350	32x4*	32x4*	LeR.	4-3½x4½	Eise.	.....	none	Zenith	B. & B.	Durston	in-g	Clark	Gem.
Stewart, 8	1	1,695	34x2½	34x4	Cont.	4-3½x5	Eise.	.....	Spec.	Zenith	Fuller	Fuller	in-g	Clark	Gem.
Stewart, 9	1½	2,250	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Spec.	Zenith	Fuller	Fuller	in-g	Clark	Ross
Stewart, 7	2	2,875	34x4	34x4d	Cont.	4-4½x5½	Eise.	.....	Pierce	Zenith	Fuller	Fuller	in-g	Clark	Ross
Stewart, 10	3½	3,895	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	.....	Shel.	.....
Stoughton, B	1½	2,200	36x3½	36x5	Wauk.	4-3½x5½	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	.....	Shel.	.....
Stoughton, D	2	2,600	36x4	36x7	Wauk.	4-4x5½	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	.....	Shel.	.....
Stoughton, E	3	3,000	36x4	36x5d	Wauk.	4-4½x5½	Eise.	.....	.....	.....	.....	Covert	worm	Timkn.	Ross
Sullivan, F	1½	2,350	36x4	36x5	Buda	4-3½x4½	Bosch	.....	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sullivan, E	2	2,975	36x4	36x7	Buda	4-4½x5½	Bosch	.....	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sullivan, H	3½	.....	36x5	36x5d	Buda	4-4½x6	Bosch	.....	none	Strom.	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Super Truck 50	2½	3,200	36x4	36x8	Wis.	4-4x6	.....	Vesta	Simplx.	Zenith	Fuller	.....	worm	Shel.	Ross
Super Truck 70	3½	4,100	36x5	40x5d	Wis.	4-4½x6	.....	Vesta	Simplx.	Zenith	Fuller	.....	worm	Shel.	Ross
Super Truck 100	5	4,800	36x5	40x6d	Wis.	4-4½x6	.....	Vesta	Simplx.	Zenith	Eill	.....	worm	Shel.	Ross
Superior D	1	1,675	34x4½	34x4	Cont.	4-3½x5	Eise.	Opt.	Pierce	Strom.	Fuller	Fuller	in-g	Torbn.	C.A.S.
Superior E	2	2,600	34x4	36x6	Cont.	4-4½x5½	Eise.	Opt.	Pierce	Strom.	Fuller	Fuller	in-g	Torbn.	Ross
Texan	1½	1,525	34x4*	34x5	Lyc.	4-3½x5	Conn.	Bijur	.....	Car.	B. & B.	B-Lipe	wor.a	Chego.	C.A.S.
Tiffin A	¾	1,100	35x4½	35x4½*	Cont.	4-3½x5	Bosch	none	none	Scheb.	Det.	Det.	in-g	Russel	Lavn.
Tiffin GW	1½	2,530	36x3½	36x5	Cont.	4-3½x5½	Bosch	none	Pierce	Scheb.	Fuller	Fuller	worm	Shel.	Ross
Tiffin MW	2½	3,350	36x4	36x3½d	Cont.	4-4½x5½	Bosch	none	Fierce	Scheb.	Hart.	Fuller	worm	Shel.	Ross
Tiffin PW	3½	4,375	36x5	36x5d	Cont.	4-4½x5½	Bosch	West.	Fierce	Scheb.	B. & B.	Fuller	worm	Shel.	Ross
Tiffin RW	5	5,250	36x6	40x6d	Cont.	4-4x6	Bosch	West.*	none	Scheb.	B. & B.	Covert	worm	Shel.	Ross
Tiffin SW	9	5,450	36x6	40x12	Cont.	4-4½x6	Bosch	West.*	none	Scheb.	B. & B.	Covert	worm	Shel.	Ross
Titan 2½	2½	3,400	34x4	36x4d	Buda	4-4½x5½	Eise.	none	Simplx.	Strom.	B. & B.	Cotta	in-g	Clark	Wol.
Titan, T	3½	4,400	36x5	40x5d	Buda	4-4½x6	Eise.	West.	Simplx.	Strom.	B. & B.	Cotta	in-g	Clark	Lavn.
Titan, H	6	5,400	36x6	40x6d	Buda	4-4½x6	Eise.	West.	Simplx.	Strom.	B. & B.	Cotta	in-g	Clark	Lavn.
Tower, J	1½	2,820	35x5	38x7	Cont.	4-4½x5½	Bosch	.....	.....	Zenith	.....	.....	worm	.....	Ross
Tower, H	2½	3,385	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	.....	Zenith	Fuller	Fuller	worm	.....	Ross
Tower, G	3½	4,335	36x5	36x5	Cont.	4-4½x5½	Bosch	.....	.....	Zenith	Fuller	Fuller	worm	.....	Ross
Traffic	2	1,495	34x3½	34x5	Cont.	4-3½x5	Bosch	none	none	Carter	Covert	Covert	in-g	Russel	Own
Transport, 20	1	1,850	34x3	34x4	Cont.	4-3½x5	Eise.	none	Duplx.	Strom.	Fuller	Fuller	in-g.	Clark	Jack.
Transport, 30	1½	2,250	36x3½	36x5	Cont.	4-3½x5	Eise.	none	Duplx.	Strom.	Fuller	Fuller	in-g.	Clark	Jacx.
Transport, 50	2	2,750	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Duplx.	Strom.	Fuller	Fuller	in-g.	Clark	Jacx.
Traylor, B	1	1,950	34x3½	34x5	Buda	4-4x5½	Split.	Spec.	Pierce	Zenith	Covert	Covert	.....	Shel.	Ross
Traylor, C	1½	2,750	36x4	36x6	Buda	4-4½x5½	Split.	Spec.	Pierce	Zenith	Covert	Covert	.....	Shel.	Ross
Traylor, D	2½	3,250	36x4	36x7	Buda	4-4½x5½	Split.	Spec.	Pierce	Zenith	Covert	Covert	.....	Shel.	Ross
Triangle, AA	¼	1,550	35x5	35x5	H-S	4-3½x5	N. E.	N. E.	none	Strom.	Fuller	Fuller	in-g.	Clark	Gem.
Triangle, A	1½	2,185	34x3½	34x6	Wauk.	4-3½x5½	Eise.	none	Wauk.	Strom.	Fuller	Fuller	in-g.	Clark	Gem.
Triangle, C	2	2,585	36x4	36x6	Wauk.	4-3½x5½	Eise.	.....	Wauk.	Strom.	Fuller	Fuller	in-g.	Clark	Gem.
Triangle, B	2½	2,850	36x7	36x7	Ruten.	4-4½x5½	Eise.	.....	Pierce	Strom.	Fuller	Fuller	in-g.	Clark	Ross
Twin City	2½	.....	36x4	36x7	Buda	4-4x5½	Bosch	.....	Simplx.	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Twin City	3½	.....	36x5	40x5d	Own	4-4½x6	Bosch	.....	Own	Opt.	B. & B.	Fuller	.....	.....	.....
Union, F	2½	2,925	36x5	36x8	Wis.	4-4x6	Eise.	opt.	Duplx.	Scheb.	Fuller	Fuller	in-g.	Russel	Ross
Union, H	4	3,750	36x6	36x10	Wis.	4-4½x6	Eise.	opt.	Duplx.	Scheb.	Fuller	Fuller	in-g.	Russel	Ross
United, A	1½	2,100	36x3½	36x6	Buda	4-3½x5½	Eise.	opt.	Simplx*	Strom.	B-Lipe	B-Lipe	in-g.	Clark	Ross
United, B	2½	2,850	36x4	36x7	Buda	4-4½x5½	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	in-g.	Clark	Ross
United, C	3½	3,750	36x5	36x5d	Buda	4-4½x5½	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	in-g.	Clark	Ross

Abbreviations: **Engine**—Wauk., Wauxesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Leece Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Wauxesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx, Simplex; McCan., McCanna; Rugles, Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B.Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H., Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury, Ind., Industrial; Chego., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Motor Age Monthly Guide to Truck Specifications—Concluded

These tables are revised and brought up to date monthly

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl. Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
United, V	5	4,950	36x5	40x6d	Buda	4-4½x5½	Eise.	opt.	Simplx*	Strom.	B-Lipe	B-Lipe	in-g.	Clark	Ross
United, C	1½	2,250	36x3½	36x5	Cont.	4-3½x5	Eise.	opt.	none	Strom.	B-Lipe	B-Lipe	worm	Clark	Lavn.
U. S., N. W	2½	2,650	36x3½	36x6	Cont.	4-3½x5	Eise.	opt.	none	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
U. S., R	3½	3,850	36x4	36x4d	Own	4-4½x5½	Eise.	opt.	Own	Strom.	B-Lipe	B-Lipe	Opt.	Shel.	Ross
U. S., R	5	4,450	36x5	36x5d	Own	4-4½x6½	Eise.	opt.	Simplx	Strom.	B-Lipe	Fuller	Durst.	Torbn.	Ross
U. S., S	5	5,600	36x6	40x6d	Own	4-4½x6½	Eise.	opt.	none	Strom.	B. & B	Own	in-g.	Shel.	C.A.S.
U. S., T	1½	2,050	34x4	34x5	Cont.	4-3½x5	Berl.	opt.	Mor.	Zenith	Own	Own	worm	Shel.	C.A.S.
Victor	1½	1,925	36x3½	36x5	Cont.	4-3½x5	A-K	West.	none	Zenith	Own	Own	worm	Shel.	Gem.
Velie, 46	1½	1,095	31x4	31x4	Own	4-3½x4½	A-K	West.	none	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Vim, 27	1	1,350	32x4½	32x4½	Herc.	4-3½x5½	Split.	none	none	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Vim, 28	1	2,195	35x5	35x5	Herc.	4-3½x5½	Split.	none	none	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Vim, 25	2	3,150	36x4	36x6	Herc.	4-4½x5½	Split.	none	none	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Vim, 22	3	3,950	36x5	36x5d	Herc.	4-4½x5½	Split.	none	none	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Vim, 23	3			36x5d											
Walker Johnson, B	2½	2,890	36x4	36x8	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Walter, MO	3		40x4	40x4d	Own	4-4½x6	Simms	West.	Own	Strom.	B-Lipe	Own	ext-g.	Own	Ross
Walter, S	5	5,500	36x6	40x6d	Wauk.	4-4½x6½	Bosch	West.	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Ward La France, 2-B	2½	3,590	30x4	36x7	.....	4-4½x5½	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ward La France, 4-A	3½	4,490	36x5	36x5d	.....	4-4½x6½	Bosch	West.	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Ward La France, 5-A	5	5,490	36x6	40x6d	Wauk.	4-5x6½	Conn.	Dyn.	Wauk.	John.	B-Lipe	B-Lipe	worm	Timkn.	Ross
		1,750	34x4½	34x4½	Cont.	4-3½x5½	Simms	none	Pierce	Strom.	B-Lipe	Own	bevel	Timkn.	Gem.
Watson	3½		36x5	36x10	Own	4-4½x5½	.....	.....	none	Own	Own	Own	d-rd	Own	Own
Watson	¼	2,400	34x4½	34x4½	Own	4-3½x5½	.....	.....	none	Own*	Own	Own	d-rd	Own	Own
White, 15	¼	3,300	36x4	30x7	Own	4-3½x5½	.....	.....	Own	Own*	Own	Own	d-rd	Timkn.	Ross
White, 20	2	4,500	36x5	40x5d	Own	4-4½x5½	.....	.....	Own	Strom.	Fuller	Fuller	worm	Timkn.	Ross
White, 40	5	5,000	36x6	40x6d	Own	4-3½x5	Eise.	none	Simplx	Strom.	Fuller	Fuller	worm	Timkn.	Ross
White, 45	5	2,350	35x5	35x5	Cont.	4-3½x5	Eise.	none	Simplx	Strom.	Fuller	Fuller	worm	Timkn.	Ross
White Hickory, E	1	2,350	35x5	35x5	Cont.	4-3½x5	Eise.	none	Simplx	Strom.	Fuller	Fuller	worm	Timkn.	Ross
White Hickory, H	1½	2,475	36x3½	36x5	Cont.	4-3½x5	Eise.	none	Simplx	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Wichita, L	2½	3,075	36x4	36x7	Cont.	4-4½x5½	Eise.	nope	Simplx	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Wichita, M	1½	2,350	36x3½	36x5	Own	4-3½x5½	.....	.....	none	Strom.	Own	Covert	worm	Shel.	Ross
Wichita, R	2	2,750	36x4	36x6	Wauk.	4-4½x5½	.....	.....	Wauk.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Wichita, R.X	2½	2,950	36x4	36x7	Beav.	4-4½x6	.....	.....	Dupix.	Strom.	Own	B-Lipe	worm	Shel.	Ross
Wichita, O	3½	3,400	36x4	36x8	Beav.	4-4½x6	.....	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Gem.
Wichita, S	6	3,750	36x5	36x5d	Beav.	4-3½x5½	Bosch	none	Pierce	Wil-B	Own	Own	worm	Shel.	Own
Wichita, A-1	1	5,400	36x6	40x6d	Buda	4-4½x5	Bosch	none	Pierce	Wil-B	Own	Own	worm	Shel.	Own
Wilcox, B	1½	.....	35x5	35x5	Own	4-4½x6	Bosch	none	Pierce	Wil-B	Own	Own	worm	Shel.	Own
Wilcox, C	2½	.....	36x4	36x8	Own	4-4½x5	Bosch	none	Pierce	Wil-B	Own	Own	worm	Shel.	Ross
Wilcox, E	3½	.....	36x5	36x3½d	Own	4-4½x6	Bosch	none	Pierce	Marvel	B. & B.	B-Lipe	worm	Timkn.	Ross
Wilcox, W	5	.....	36x5	36x5d	Buda	4-4½x6½	Bosch	none	Wauk.	Marvel	B. & B.	B-Lipe	worm	Timkn.	Ross
Wilcox, F	1½	2,450	36x3½	40x6d	Wauk.	4-3½x5½	Eise.	opt.	Pierce	Marvel	Warner	Warner	worm	Timkn.	Ross
Wilcox, EA	2½	3,150	36x4	30x5	Cont.	4-4½x5½	Eise.	opt.	Pierce	Marvel	Warner	Warner	worm	Clark	Lavn.
Wilson, G	3½	3,950	36x5	30x7	Cont.	4-4½x5½	Eise.	opt.	Pierce	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Wilson, H	5	4,800	36x6	36x5d	Cont.	4-3½x5	Eise.	Bijur.*	.....	Strom.	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 39	1½	2,325	34x3½	34x5	Wis.	4-3½x5	Eise.	Bijur.*	.....	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 439	1½	2,575	32x4	32x4	Wis.	4-4 x5	Eise.	Bijur.*	.....	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 49	2	4,100	36x5	34x4d	Wis.	4-4x6	Eise.	Bijur.*	.....	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 70	3	4,500	36x5	36x5d	Wis.	4-4½x6	Eise.	Bijur.*	Simplx	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 89	4	5,000	36x6	40x6d	Wis.	4-4½x6½	Eise.	Bijur.*	Simplx	Mast.*	B. & B.	B-Lipe	in-g.	Clark	Lavn.
Winther, 109	5	5,250	36x6	40x12	Wis.	4-5½x6	Eise.	Bijur.	Simplx	Strom.	Fuller	Fuller	in-g.	Clark	Ross
Winther, 129	6	5,250	36x6	40x7d	Wis.	4-5½x6	Eise.	.....	.....	Mast.	B. & B.	B-Lipe	in-g.	Clark	Ross
Winther, 149	7	5,500	36x6	34x5	Wis.	4-4x5	Eise.	Bijur.	.....	Mast.	B. & B.	B-Lipe	worm	Timkn.	Ross
Winther, 459	2½	.....	34x5	36x5d	Wis.	4-4½x6	Eise.	Bijur.	.....	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Winther, 479	3½	4,900	36x5	36x5d	Wis.	4-4x6	Eise.	.....	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Winther, 979	3½	4,250	38x7	42x9	Wis.	4-3½x5½	Eise.	.....	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Witt-Will, N	1	2,100	36x3*	36x4*	Cont.	4-4½x5½	Eise.	G&D*	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Gem.
Witt-Will, P	2½	3,150	36x3½	36x3½d	Cont.	4-3½x5	Eise.	G&D	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Gem.
Wolverine, C	1½	2,380	34x3½	34x3½d	Cont.	4-3½x5	Eise.	.....	.....	.....	.....	.....	.....	.....	.....
Wolverine, D	2	2,650	34x4	34x3½d	Cont.	4-3½x5	Eise.	.....	.....	.....	.....	.....	.....	.....	.....

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite; Wauksha; Dupl., Duplex; Cont., Continental; Mon., Monarch; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Cover**, Covert; Savg., Savage Arms; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite; Wauksha; Dupl., Duplex; Cont., Continental; Mon., Monarch; Stew., Stewart; Till., Tillotson; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite; Wauksha; Dupl., Duplex; Cont., Continental; Mon., Monarch; Stew., Stewart; Till., Tillotson; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite; Wauksha; Dupl., Duplex; Cont., Continental; Mon., Monarch; Stew., Stewart; Till., Tillotson; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite; Wauksha; Dupl., Duplex; Cont., Continental; Mon., Monarch; Stew., Stewart; Till., Tillotson; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite; Wauksha; Dupl., Duplex; Cont., Continental; Mon., Monarch; Stew., Stewart; Till., Tillotson; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite; Wauksha; Dupl., Duplex; Cont., Continental; Mon., Monarch; Stew., Stewart; Till., Tillotson; Asterisk, electric starting also. **Carburetor**—Schebler; Strom., Stromberg; Ray., Rayfield; H-Shaw, Hele-Shaw; Meeh., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Timken; Torbn., Torbenson; Key-Et., Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chego., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Dfw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

A BASEBALL SCORE BOARD FOR THE SHOP

(*Concluded from page 11*)

also are added horizontally and the total obtained; then, to prove the sheet the number of hours of work done by each mechanic on each job are added vertically, in each column and the totals obtained by adding across the sheet must correspond with the totals obtained by adding up and down it; that is, the total number of hours worked, brought across the sheet, horizontally, must tally with the totals obtained by adding vertically each column.

When the jobs are billed out, they are checked up from this Weekly Job and Time Sheet. The firm has found this to be the handiest form, as telling everything about a job at a glance, it ever has used about the shop.

Where sales of parts are made, they are recorded in the service station office on a manifolding machine, which turns out triplicates. The first copy is sent to the office; the duplicate goes to the mechanic handling the job, and the triplicate goes to the customer, in the case of cash sales. In that instance, the word cash is placed on Sheet No. 1. If the goods are charged to the customer's account, they are billed to the office.

Miniature Mezzanine in the Stockroom

The stockroom, forming a partitioned off bay, with the office in the upper end of the floor, is 14 ft. by 12 ft., contains 282 bins of varying size and twenty-four drawers, ranged on three sides of the room, with a miniature mezzanine on either side of a shaft extending to the ceiling. On this small gallery, which measures 4 ft. from wall to shaft on either side, and which extends nearly the depth of the stockroom, are stored stock odds and ends, reserve chains, tires and tubes, stationary and empty boxes that may be needed.

Each bin and drawer are numbered plainly and, in a loose-leaf book, a corresponding number, describing parts contained in that bin, is registered. For instance, in the book, "No. 170" would indicate that in the bin of that number are to be found piston pins for Apperson engines.

No requisitions are used for issuing parts or other supplies from the stockroom, but the stock clerk keeps close tab on what he gives out, and is responsible therefor.

The stockroom is adjacent to the desk of the service manager, from whose office it is separated by a partition having a glass door, by the side of which there is a large, oblong open space, equipped with shutter for locking, and a shelf, over which to pass out the supplies issued.

A door between the service manager's desk and the stockroom partition leads into the shop and service station proper. Entrance to the service manager's office, direct, is by way of stairs from the first floor, to reach which it is necessary to pass through an outer office.

Where Parts Can Be Obtained for Orphan Passenger Cars and Trucks

Motor Age Maintenance Data Sheet No. 96

One of a series of weekly pages of information valuable to service men and dealers—save this page

Ohio
Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291-93 Marietta Ave., Atlanta.
Auto Parts Co., 2801-11 Preston Ave., Houston, Tex.
Auto Salvage, Tulsa, Okla.
Northway Auto Parts & Sales Co., 223 Kearney St., Cincinnati.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.
Smith Corp., A. O., Milwaukee.

Palmer-Singer
Auto Gear Co., 844 Eighth Ave., New York.
Auto Parts Co., 4116 Olive St., St. Louis.
Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
Puritan Machine Co., 409 Lafayette blvd., Detroit.
Service Gear & Machine Co. Reading, Pa.
Singer Motor Co., 102 West End Ave., New York.

Parry
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291-93 Marietta Ave., Atlanta.
Auto Parts Co., 2801-11 Preston Ave., Houston, Tex.
Auto Parts Co., 2116-18 Olive St., St. Louis.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.
Wolf Auto Parts & Tire Co., I., 619 N. Illinois St., Indianapolis.

Partin-Palmer
Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291-93 Marietta Ave., Atlanta.
Auto Parts Co., 2801-11 Preston Ave., Houston, Tex.
Auto Parts Co., 4116-18 Olive St., St. Louis.
Commonwealth Motors Co., 326 W. Madison St., Chicago.
Sattler's Machine Shops & Works, 1601 Spring Garden St., Philadelphia.
Service Gear & Machine Co., Reading, Pa.

Pathfinder
American Motors Parts Co., Indianapolis.
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291-93 Marietta Ave., Atlanta.
Auto Parts Co., 2801-11 Preston Ave., Houston, Tex.
Dayton Auto Parts Co., 1777 Broadway, New York.
Pathfinder Co., 1136 Division St., Indianapolis.
Wolf Auto Parts & Tire Co., I., 619 N. Illinois St., Indianapolis.

Pontiac
Auto Gear & Parts Co., 291-93 Marietta Ave., Atlanta.

Pierce-Racine
J. I. Case T. M. Co., Racine, Wis.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.

Pope-Hartford
Auto Parts Co., 2801-11 Preston Ave., Houston, Tex.
Auto Salvage Co., 1701-13 Main St., Kansas City.
Boulevard Motor Co., Cambridge, Mass.
Hartford Motor Car Co., Hartford, Conn.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.
Rosenfield, J., 521 Sixth St., Boston.
Walker & Barkman Mfg. Co., Hartford, Conn.
Wolf Auto Parts & Tire Co., 619 N. Illinois St., Indianapolis.

Pope-Toledo
Auto Parts Co., Houston, Tex.
Auto Salvage Parts Co., 1436 S. Wabash Ave., Chicago.
Connecticut Auto Parts Co., Hartford, Conn.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.

Pope-Tribune
Auto Salvage & Exchange Co., 1317 Locust St., Des Moines.
Hartford Motor Car Co., 410 Main St., Hartford, Conn.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.
Walker & Barkman Mfg. Co., Hartford, Conn.

Pratt
Elkhart Carriage & Motor Car Co., Elkhart, Ind.

Princess
Auto Gear & Parts Co., 291 Marietta St., Atlanta.

Rambler
Auto Parts Co., 2801-11 Preston Ave., Houston, Tex.
Auto Salvage & Exchange Co., 1317 Locust St., Des Moines.
Auto Salvage, Tulsa, Okla.
Nash Motors Co., Kenosha, Wis.
The Boneyard, Washington, Ia.
Wolf Auto Parts & Tire Co., I., 619 N. Illinois St., Indianapolis.
Wycoff Auto Salvage Co., Sioux City, Ia.

Ranier
Garford Motor Truck Co., Lima, O.
Gramm Motor Truck Co., Lima, O.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.

Rapid
Auto Parts Co., 2801 Preston Ave., Houston, Tex.
Puritan Machine Co., Detroit.

Regal
Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291-93 Marietta Ave., Atlanta.
Auto Salvage, Tulsa, Okla.
Auto Salvage & Exchange Co., 1317 Locust St., Des Moines.
Auto Parts Co., 4116 Olive St., St. Louis.
Auto Parts Co., 2801 Preston Ave., Houston, Tex.
Gorey & Co., Jos. C., 354 W 50th St., New York.
Levene Motor Co., 2200-18 Diamond St., Philadelphia.
Sattler's Machine Shops & Works, 1601 Spring Garden St., Philadelphia.
Service Gear & Machine Co., Reading, Pa.
Wolf Auto Parts & Tire Co., I., 619 N. Illinois St., Indianapolis.

Rider-Lewis
American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.
Auto Parts Mfg. Co., Detroit.
Longaker Co., V. A., 448 N. Capitol Ave., Indianapolis.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.
Wichita Auto Wrecking Co., 801 W. Douglas Ave., Wichita.

Ross
Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Dayton Auto Parts Co., 1777 Broadway, New York.
Great Western Auto Co., Kalamazoo, Mich.
Levene Motor Co., 2200-18 Diamond St., Philadelphia.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.
Standard Motor Parts Co., New Castle, Ind.

Royal Tourist
Auto Parts Co., 4116 Olive St., St. Louis.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.

R. C. H.
Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291 Marietta St., Atlanta.
Auto Parts Co., 2801-11 Preston Ave., Houston, Tex.
Auto Parts Co., 4116-18 Olive St., St. Louis.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Johns Auto & Machine Works, W. H., 908 Pico St., Los Angeles.
Philadelphia Machine Works, 67 Laurel St., Philadelphia.
Wolf Auto Parts & Tire Co., I., 619 N. Illinois St., Indianapolis.

Schacht
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Buda Co., Harvey, Ill.
Puritan Machine Co., 409 Lafayette Blvd., Detroit.
Schacht Motor Truck Co., G. A., Cincinnati.

Selden
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291 Marietta St., Atlanta.
Auto Parts Co., 2801-11 Preston Ave., Houston, Tex.
Puritan Machine Co., 409 Lafayette blvd., Detroit.
Sattler's Machine Shops & Works, 1601 Spring Garden St., Philadelphia.
Shepard Auto Co., 106 Pennsylvania Ave., Brooklyn.

Speedwell
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Auto Parts Co., 2801-11 Preston Ave., Houston, Tex.
Green Engineering Co., Dayton.
Kany, A. S., 633 Homewood Ave., Dayton.
Northway Auto Parts & Sales Co., 223 Kearney St., Cincinnati.
Puritan Machine Co., 409 Lafayette blvd., Detroit.
Wolf Auto Parts & Tire Co., 619 N. Illinois St., Indianapolis.

S. G. V.
Service Gear & Machine Co., Reading, Pa.

Sphinx
Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291 Marietta St., Atlanta.
Dayton Auto Parts Co., 1777 Broadway, New York.
Sattler's Machine Shops & Works, 1601 Spring Garden St., Philadelphia.
Service Gear & Machine Co., Reading, Pa.

Stayer
Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291 Marietta Ave., Atlanta.
Auto Parts Co., 2801-11 Preston Ave., Houston, Tex.
Dayton Auto Parts Co., 1777 Broadway, New York.
Puritan Machine Co., 409 Lafayette blvd., Detroit.
The Boneyard, Washington, Ia.

States
Auto Auction Co., 519 W. Jackson Blvd., Chicago.

Stoddard-Dayton
Auto Gear Co., 844 Eighth Ave., New York.
Auto Gear & Parts Co., 291 Marietta Ave., Atlanta.
Auto Parts Co., 2801 Preston Ave., Houston, Tex.
Boulevard Motor Co., 276 River St., Cambridge, Mass.
Dayton Auto Parts Co., 1777 Broadway, New York.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Green Engineering Co., Dayton.
Sattler's Machine Shops & Works, 1601 Spring Garden St., Philadelphia.
Service Gear & Machine Co., Reading, Pa.
Standard Motor Parts Co., New Castle, Ind.
Warshawsky & Co., 1918 S. State St., Chicago.
Wichita Auto Wrecking Co., 801 W. Douglas Ave., Wichita.
Wolf Auto Parts & Tire Co., I., 619 N. Illinois St., Indianapolis.

Thomas
Auto Parts Co., 2801 Preston Ave., Houston, Tex.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Johns, W. H., 908-12 W. Pico St., Los Angeles.
Rosenfield, J., 521 Sixth St., Boston.
Thomas Motor Car Co., Buffalo.
Wolf Auto Parts & Tire Co., I., 619 N. Illinois St., Indianapolis.

From the Four Winds

Glimpses at the World of Motordom

Coming Motor Events

AUTOMOBILE SHOWS

Northampton, Mass.	Annual Automobile Show	Oct. 6-8

FOREIGN SHOWS

Antwerp	Cars, Tires, Wheels, Parts and Equipment	May 15—June 13
Antwerp	Commercial Vehicles, Tractors, Trucks and Engines	June 26—July 25
Antwerp	Motorcycles, Side Cars, Parts and Equipment	Aug. 7-Sept. 15
London, Eng.	Commercial Vehicles Exhibition, Olympia	October
London	Passenger Car Show, Olympia	November

CONVENTIONS

Charleston, S. C.	South Carolina Automotive Trade Ass'n	June 24, 25

RACES

Indianapolis	500-Mile Speedway Race	May 31
Uniontown, Pa.	Speedway Race	June 12
Tacoma, Wash.	Speedway Race	July 5
Paris, France	Grand Prix Race, Sporting Commission	August
Cincinnati, O.	Speedway Race	Sept. 6
Uniontown, Pa.	Speedway Race	Sept. 6

TOURS

Salt Lake City-Boise	Truck Tour	May 17-27
Atlanta, Ga.	Truck Tour	May 17-22
Omaha, Neb.	Truck Reliability Run	June 14
Milwaukee, Wis.	Wisconsin Truck Tour, Milwaukee Sentinel	June 21-26
Lake Huron Tour	Michigan Pikes Ass'n	July 4
New York-San Francisco	Glidden Tour	September

Columbus, Ohio, Revises Traffic Rules—In order to relieve the congestion in the downtown district of Columbus, Ohio, and provide a parking space, the Central Auto Park Co. has been formed by Robert C. Boyd. The concern has leased a large vacant lot which is close to the business section and accommodations for 300 cars will be provided. An ordinance has been adopted making all downtown alleys one-way parking thoroughfares and this will make parking space more necessary.

Compressed Air Car Washing System—In the opinion of local dealers washing of cars is something of a lost art all because washers want more for the work than they can earn for the house. Six dollars a day or night is the prevailing rate. One of the six dollar washers had a string of cars on which to work. He contrived to get out two of them which brought the house $4.00. Dealers are doing as little washing as possible and that largely for themselves only. The situation as might be expected is an opportunity for a hustler who is willing to get his hands a bit wet and muddy. T. J. Foley, proprietor of the Metropolitan Service Co., has gone after this washing and has all the business he can handle. He has one big advantage. He uses a system of compressed air washing that thoroughly cleanses a car in ten minutes or slightly more. At any rate Foley would deem it a very poor hour in which he could not account for at least four cars. By the process of simple multiplication it is evident that Foley is making a dollar now and then at $2.00 the wash.

Motorized Machine Guns in Boston—Another use the automobile has been put to is for mounting machine guns for the Boston police department so they may be hurried about the city to cope with any uprising, rioting or lawless outbreak which may occur in the future. Seven guns, distributed at vantage points about the city, are ready for use any hour of the day or night on a moment's notice. They are mounted on specially designed supports in the rear of automobiles owned by the department.

Between six and fourteen expert machine gunners are attached to each one of the nineteen city stations—enough to man each gun are on duty each of the twenty-four hours. In addition there are always available trained ex-service men in each division, specially drilled in the use of Winchester rifles and riot guns.

Wisconsin Registration Increasing—Wisconsin has exceeded all past records for registration of motor vehicles, the issue of licenses up to May 1 being 214,000 for private owners' passenger cars; 12,000 for motor trucks; 4,350 for motorcycles, and 1,708 for dealers, a total of 232,058. On numerous days during April, as high as 7250 license applications were filled in a single day, the registry department of the secretary of state's office working overtime so that every day's mail would be filled on that day, and give no one reason for employing a "License Applied For" tag. Secretary of State Merlin Hull estimated that there were 25,000 unregistered cars in Wisconsin on May 1, including cars in hands of dealers waiting for delivery to purchasers. He estimates a total issue of 300,000 licenses in 1920, against 226,093 issued in 1919. The fee for passenger cars is $10 per annum; for dealers, $25, and for trucks it is graduated according to weight, giving an estimated income of more than $3,000,000 to the state of Wisconsin from motor vehicle registration in 1920.

In London, Ont., they use city electric current to prevent freezing in winter. Keys to the switch boxes are rented for a small annual sum